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Impacts of Early Bilingual Exposure on Deaf Children – A Survey and Discussion

by

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To those who taught me
and
those from whom I learned.

Preface

Before setting off, I feel the need to make a few explanatory statements regarding the title and other aspects of this paper. I chose the wording of “early” bilingual exposure, because my focus is on the impact on child development – in contrast to late deafened individuals or hearing-impaired adults growing up aural-orally, who do not have any contact to signs until at least adolescence. But since this population is fairly limited, I cannot specify this “early” to the first, for example, 6 years of life, but have to take what restricted literature is available. Also, many aspects of development experience substantial growth after this age.

Secondly, the term *deaf* is used frequently in this paper but has partially different connotations, depending on the studies presented. For the most part it denotes children with an average hearing loss of at least 90dB on the better ear, and/or children found to have insufficient speech comprehension to communicate primarily orally. Obviously, terms and features may also be subject to the educational approach that is implemented in each case.

And several other restrictions apply when viewing studies on deafness. Marschark (2001) puts it this way: „Unfortunately, many of the research findings are contradictory or inconclusive, a standard problem with an evolving area of research with small numbers of subjects in a variety of settings. Numerous questions remain unanswered“(p. 1).

In Germany, the currently prevalent view leaves no doubt that spoken language should be strongly promoted in all hearing-impaired children, no matter what degree of hearing loss and what kind of educational environment applies to them individually. The question of interest here is therefore not that of the possible advantages of aural linguistic input or interaction in the oral-aural mode (to pay tribute to the interactionalistic paradigm currently promoted in deaf education (e.g. Diller & Horsch, 1997)) on the development of deaf children that are otherwise raised with sign language (a discussion that needs to be lead – and increasingly is – in the Scandinavian countries (Angerby 2000) and even the strongholds of ASL¹-promoters in the USA (Marschark 2001) – and particularly so in children with CI².

For his paper I will mainly restrict myself to presenting and discussing studies and essays that compare and contrast the advantages and drawbacks of educational approaches implementing some form of sign communication and speech. Terms and definitions for them (particularly TC³ and Bilingualism) vary greatly across institutions, but I refrained from cumbersome explanations and definitions in each single case. Significant distinctions are noted where applicable.

Because of the apparent interdependence of most of the aspects composing a child’s ‘general’ development (all of them – except for, maybe, physical growth – are at least to some degree subject to the influence of language and interaction), it comes as no surprise that many of the articles cited could be taken as reference in a number of chapters. However, to avoid a continuous repetition while still

¹ ASL = American Sign Language

² CI = Cochlear Implant

³ TC = Total Communication

focusing on different subtopics I grouped them the way it seemed appropriate to me, and hope the reader will make any missing cross-references as he or she goes along.

I also did not consider it relevant or helpful to include detailed historical reviews or to elaborate in depth on opinions generally accepted as completely outdated⁴, since they can be looked up in a large body of already existing literature. I therefore omitted such lengthy excursions. Instead, I attempt to present the most prominent and present-day studies or views on each subtopic, compare and contrast them⁵ and rather obtain personal statements from some of the world's most respected authorities in deaf education. I would like to add that it has been a great honour for me and a blissful learning experience, that so many of those who are leading in their field and whose research this paper largely relies on have taken the time to answer my request for statements and partially even sent personal copies and originals of their publications!! So my deepest appreciation and great thanks goes out to them!

In addition, I interviewed some of my own (deaf) acquaintances (most of whom can be considered bilingual⁶) on their own experiences and convictions to offer truly authentic and up to date information – since, as Hintermair (2001a) puts it “we have to discuss and – where necessary – optimize the living conditions also from the point of view of those concerned”⁷(p.31).

As is known by most in this area of profession, there is much controversy over the pros and cons of bilingual exposure on deaf children. So it was my personal curiosity that was the driving force for this paper and the great puzzlement over why there are so vehemently opposing and highly emotionally advocated positions in this discussion. Also, my personal experiences and discourses with parents and deaf adults defy much of what I read and hear, which nurtured in me the desire to investigate this issue in more depth.

With a multifactorial and controversial topic such as this one, it is expectable that the further I progressed, the higher the stacks of continuing literature on specific chapters rose – as is usually the case. And I deeply regret to not have been able to work them through at the same speed, which leaves me now with the conviction that much more needs to be read and said about this topic in the future – which I am inclined to do. So what is presented here is a preliminary result to a continuing discourse and I would like to invite anybody to join in who has a positive attitude towards social friction and who is willing to critically reflect his or her views.

⁴ Many convictions regarding deafness (such as, e.g., on the personality and intelligence of “the Deaf” or on the struggle for linguistic recognition of sign language) are by now agreed to be outdated and were often based on false premises due to lack of scientific knowledge. (compare Krüger, 1987).

⁵ Whenever two or more studies on the same subtopic were available.

⁶ For a discussion on different definitions of this term see below.

⁷ Original quote: “Es gilt, die Lebensbedingungen auch aus Sicht der Betroffenen heraus zu diskutieren und – wo nötig – zu optimieren” (translation by jh.).

1. Bilingualism

The discussion on bilingualisms as a general topic starts out with a noteworthy caveat: It is assumed that the majority of the world population grows up in some sort of contact with two or more languages (Wagner, 2001; Petitto et al., 2001; Grosjean, 1993, 1998; Boyes Braem, 1995). However, there is quite some confusion in definitions of the terminology, from vague phrasing such as “knowing and using” two languages (Grosjean, 1998, 2) to demands such as having ‘native command’ of both languages to be rightfully called ‘bilingual’ (for a brief discussion see Ricke & Ueding, 2002; or Grosjean, 1993). Naturally, by degree of definition, the respective population also varies considerably in size and characteristics. But what almost all prevailing definitions of bilingualism agree upon, either explicit or implicit, is that it refers to two *spoken* languages⁸. With respect to deafness, however, the state of affairs is much different: Signed and spoken languages vary greatly in many aspects (although not as many as sometimes assumed!), most prominent being their implemented *modality*, i.e. spoken languages are perceived through the auditory tract and produced by vocal articulation of the exhalatory air stream, while sign languages are of visuo-spatial nature, perceived through the eyes and produced by motor activity of hands, face and the entire upper body.

For deaf individuals making regular use of some form of sign communication system, bilingualism – in a more moderate sense of the word – presents the every day reality, as long as they live and interact with members of the hearing (and speaking) mainstream society (Matthes, 1996). However, this is a different type of bilingualism than that found in most hearing people, since two or more spoken languages will still all be processed and produced in the same modality (see above), whereas learning one spoken and one signed language presents a case of *bimodal* bilingualism.

There are also investigations in deaf children acquiring two sign languages, as well as hearing children – usually CODA⁹ – growing up with one spoken and one sign language, but the results are less spectacular than might be expected: Generally, these children mature to native proficiency in both languages without mentionable delays, confusion or disadvantage in either system (Funk, 2000; Petitto, 2000; Petitto et al., 2001a; Pruss Romagosa, in press).

In the case of CODA, whose bilingualism is also a bimodal one (and in very most cases one of more equal proficiency in sign and speech than achieved by deaf children), it has repeatedly been observed that both languages are produced simultaneously without interference, despite two seemingly contradicting syntaxes (Petitto & Marentette, 1991; Petitto et al., 2001a; and others). Although sometimes spoken sentences are formed in sign language word order or typical sign prepositions or the like are vocalized¹⁰, these phenomena were substantiated to be preliminary stages without lasting effect or damage to the children’s further language and general development (Petitto et al., 2001a; Kammerer, 1998). Also,

⁸ In fact, the sources cited in this paragraph are actually exceptions from this statement, since they all deal with bimodal bilingualism of deaf individuals.

⁹ CODA: abbr. for *hearing Children Of Deaf Adults*.

¹⁰ Which is a definite sign for interference!

the mixing and confusion of language that has been observed in some incidents was demonstrated to be directly related to the degree of parental mixing of languages (e.g., Petitto et al., 2001). It is therefore usually recommended to obey the ‘one person – one language’ rule (Butzkamm & Butzkamm, 1999), i.e. each linguistic role model uses only one language in interactions with the child, even if they have both at native command.

On a more pragmatic level, CODA are generally reported to have no difficulty to *code-switch*¹¹ according to the communicative situation (Wagner, 2001; Petitto, 2001c; Mayer & Akamatsu, 1999; Funk, 2000; Kammerer, 1998), which indicates a subconscious ability to differentiate between the two codes – just like hearing children growing up with two spoken languages do.

And one further discovery: Funk (2000) reviewed studies on the development of CODA in depth and suggested (in rendering a study of Meilicke, 1994), that auditory short term memory and attention span as well as the ability to discriminate sounds are hindered in these children. But all three of these areas, Meilicke maintains, are essential for the acquisition of spoken language. This notion, however, stands in contrast to the practical observations reported above. The discrepancy of these findings is likely to be caused by the impact of other, significant but in those studies disregarded factors, such as cognitive and social stimulation, emotional stability, and the like.

However, these marginal populations – CODA and deaf individuals with two sign languages – are not the main focus of this paper, and they should be paid more attention to at a different place, although some of the findings appear in the discussion later on.

¹¹ *Code-switching*: to adapt to a particular interlocutor’s communication style and mode.

2. General Aspects of Language Development

It is by now well established that deaf and hearing children prelingually exposed to a sign language exhibit a language acquisition much like that of hearing children acquiring speech (see Chapter 9 for details). This proves that a general ability to master a language is not hindered by deafness. Still, it is common knowledge that deaf individuals usually show great arrears in vocabulary, grammar, vocal articulation, literacy, etc. compared to hearing peers. But what, if not deafness as such, are the factors causing these deficits, and what role does the mode of communication used with a deaf child play in this connection?

First of all, it has to be recognized that the developmental stage of a deaf child demonstrating such gross deficits is not simply equal to that of younger hearing children. Usually, deaf children are only ‘selectively’ delayed, and in many areas of linguistic, cognitive, and social development age appropriate (Meadow, 1980).

In this chapter, we will look at some findings related to more than just one of the following subtopics, which is why they have been subsumed in this general chapter on language development.

2.1. Semantic comprehension in different modalities

Within his investigations into the interrelation of communication, deafness, and cognition, Diller (1987) reviewed several studies on semantic comprehension in deaf individuals. Usually, simple instructions or brief stories were presented to the subjects in different modalities. They were asked to either follow the instructions or answer simple multiple choice questions on the content of the stories, thus demonstrating the degree of their semantic comprehension in each modality. Most of the studies found that comprehension was best when the material was presented in Total Communication: “A combination of hearing, lip reading and signs yielded the best results. Children with sign competence had better comprehension than those without”¹²(Diller, 1987, 161). However, he reasons that because of their visual and sometimes iconic nature, signs illustrate and conceptualize concrete actions (at least in tests probing such actions) and would thus provide hints to the meaning of a sign, which a spoken word – by nature of its modality restraints – cannot, and that this in turn lead to test results mistakingly suggesting an advantage of signs or simultaneous communication. He concludes: „Although (...) comprehension was better in Total Communication

¹² Original quote: “Bei einer Kombination von Hören, Lippenlesen und Gebärden waren die Leistungen am besten. Kinder mit Gebärdenkenntnissen verstanden mehr als Kinder ohne“ (translation by jh.).

2. General Aspects of Language Development

than with speech alone, these test results do not imply that children in a TC setting process language better than others”¹³ (p. 163).

It appears to me that this provokes the question of what „language processing“ exactly denotes! For if it includes decoding the meaning of a linguistic signal – modality free spoken –, as I understand it does, then this is what the tests correctly measured¹⁴ and TC does in fact have an advantage over pure spoken language, whether this is due to visual cues or not.

In addition, it has been substantiated that deaf people generally do not draw this presumed additional information from iconic signs, because signing children acquire them via inherent linguistic criteria and not by making use of their ideographic nature (compare Boyes Braem, 1995, p. 38). Diller himself states that producing a sign can be highly similar to executing part of the action itself, which allows for easier cognitive processing (Diller, 1987, 163). This view is completely in line with modern convictions in the field of psychology, that information is often retained more easily when processed through several senses. This in turn would give strength to the idea of including signs into interactions with deaf children to aid their language and cognitive development.

Prillwitz & Wudtke (1988) devised a bilingual early intervention program in Hamburg, Germany, and accompanied an entire age group¹⁵ over 6 years, conducting case studies on the 10 families comprising this group. Most of the children had a hearing loss of at least 100dB on the better ear, although one was later discovered to have considerably more functional hearing than originally assumed (compare Chapter 3). During a pre-phase (1980-1983), weekly sessions were conducted by Deaf Ed university majors with the families (mainly) in their homes, and parents were offered courses in speech-based sign¹⁶, informative lectures and continuous contact. Systematic report of progression commenced with the children’s’ transition to Kindergarten. Interviews, observations (personal and videotaped¹⁷) of a variety of different interactive situations, as well as informally designed evaluations for signed and spoken vocabulary were conducted. Results were compared to findings of a pre-intervention study the authors had conducted in 1977. Specific focus was given to the linguistic and communicative development of the children under bilingual conditions.

This study will be referred to in several chapters of this paper, but in regard to language development in general the authors claim that a combination of communication media ensures a higher degree of semantic comprehension since it

¹³ Original quote: “Obwohl ... das Verständnis mittels Total Communication besser war, als nur mit Lautsprache, lässt das Ergebnis dieser Tests nicht die Schlussfolgerung zu, dass Kinder aus einem Total Communication Programm besser Sprache verarbeiten als andere“ (translation by jh.).

¹⁴ Although the test items may be not representative for (abstract) language.

¹⁵ i.e. all families contacting the *Frühförder- und Beratungsstelle, Hamburg* and agreeing to take part in the program in 1981.

¹⁶ plus corresponding videos for home revision – which I personally find leave much room for improvement, since sentences are presented in speech-based sign that seem to be lexically confusing. For example, in the sentence “Mama zieht deine Jacke aus”, *Jacke* is signed as in putting **on** a jacket while *aus* shows taking it off! Similarly, “Mama zieht deine *Hose aus*“ or „Bitte steh auf“ with sign for *bitte* + sign for *stehen* + lifting hands up, instead of one sign for *aufstehen*. This seems counter productive to me and reminds me of SEE examples nowadays produced as jokes, such as *butterfly* = *butter* + *fly*, or *carpet* = *car* + *pet*. However, parents seem to have adopted this way of signing as a stepping stone to more differentiated sign / speech codes, depending on situation, intention, and communication partner (as was the development according to Prillwitz & Wudtke, 1988).

¹⁷ Which were later transcribed and analyzed.

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allows a facilitation of all available language resources in a child: “The most crucial feature of this early sign supported communication [is] that usually several media are combined and therefore communication is secured in several ways”¹⁸(Prillwitz & Wudtke, 1988, 85).

2.2. Vocabulary

Since vocabulary can be elicited relatively easy (albeit not always extensive and reliable – depending on test parameters and manner of instruction), many authors elaborate on comparisons of hearing children to oral and bilingual deaf children (Krüger, 1987; Prillwitz, 1986; and others). Prillwitz (1986), for example, reports a vocabulary fund in orally raised 6-year olds of approximately 250 productive and 500 receptive words, which (he refers to a publication by Löwe from 1982) was the desired norm for orally high achieving deaf children. To the present day, this figure should have risen to the same as in hearing children through modern aural educational, medical and technical efforts¹⁹. The average receptive vocabulary in hearing peers was estimated to comprise 2400 words. But Augst (1977 and 1984, also cited in Prillwitz, 1986) observed 10 hearing children over a four months period and counted every word they produced and/or demonstrated to comprehend, which added up to a total of 5.100 active and 27.000 passive words on average. Such a tedious procedure has never been conducted with deaf children to allow an adequate comparison, but even for 14-year olds van Uden assumes a passive vocabulary fund of 3.800 words - with 15.000 meanings in total (as quoted in Prillwitz, 1986, 88). But this as well adds up to only a fifth of the vocabulary of a regular six-year-old, even though it may have a higher intellectual level. Csányi (1982) also compared the vocabulary in hearing and deaf children and found a delay of several years.

In dividing her subjects into groups according to their prime mode of communication, Meadow (1980) describes that 13 DD²⁰-children and 13 DH²¹-children were tested on the TOEFL²² (age average 17;9, but the DH-group was in average more than 12 months older than the DD-children). DD scored significantly better in three of the four subtests and the overall score. She argues that these children had all learned ASL at home and had thereby a solid first language at their command, which obviously aided them in learning spoken and written English as second language at school. They outperformed the DH-group despite being a year younger and the DH-children having been exposed to oral English from birth.

One would have to assume that these figures are long outdated by now because of modern hearing aids and great benefits through cochlear implants (CI). But Szagun (2001b) refers to a recent study by Connor and his colleagues, investigating vocabulary in a large population of implanted children in the USA. They found that the children implanted at age 5 and younger and exercising Total Communication had a far stronger vocabulary than those children using only

¹⁸ Original quote: “Das wichtigste Charakteristikum dieser frühen gebärdengestützten Kommunikation [ist,] dass oft mehrere Medien miteinander kombiniert werden und dadurch eine mehrfach abgesicherte multimediale Verständigung vonstatten geht“ (translation by jh.).

¹⁹ However: See discussion below (Szágún, 2001b).

²⁰ DD: Deaf children with at least one deaf parent

²¹ DH: Deaf children of hearing parents

²² TOEFL: Test Of English as a Foreign Language

2. General Aspects of Language Development

spoken language. „This finding might indicate that the signs provide the children with an easier access to the use of a symbol system. From an educational point of view, an easy access to the command of symbols is to be valued highly, since it will have positive effects on thought and recognition, because the children will have a larger choice of symbols at their command to work with“ (Szagun 2001b, 266). This view is supported by observations of Hildmann (A., 2002), a German medical authority in the rehabilitation of children with CIs, who describes a few cases of children whose parents first adopted sign language and opted for an implantation later (at various ages), and who increasingly abandoned signs (more-so than by initiative of the parents!) by the degree their aural and oral skills improved. She suggests that the signs provided an effective bridge over the preliminary gap of insufficient spoken language that proved to stay without negative effect to the child’s aural development, (spoken) language acquisition or motivation to transfer to speech later. “The signs simply became obsolete and disappeared at some point in time” (Hildmann, A., 2002). This is in accordance with discourses I have led with parents of cochlear implanted children in Sweden, regarding their original expectations towards the implant and the eventual progress of their youngsters. The Swedish social system provides all families of deaf children with sign language courses and a variety of other services, and all parents interviewed by me had a very positive attitude towards signs. Their hopes had in most cases merely been to increase the residual hearing and provide an option for aural training, perception of traffic noise and similarly modest aspirations. However, most were astonished to see the unexpectedly great progresses of their child in spoken language, and quite a number of them transferred from a school class instructed in Swedish Sign Language to a class with speech-based instruction. The aural and oral abilities of the children seemed to be lacking nowhere behind many orally trained German children (with CI), but obviously, systematic investigations would have to be made for an accurate comparison.

2.3. Length of communicative sequences

Prillwitz and Wudtke (1988) counted the number of steps in a communicative sequence²³ and found that 65% of all those aurally raised deaf children were involved in contained only one or two steps (initiation plus response). One third of sequences of the bilingual children, on the contrary, featured six or more steps, one tenth even nine to 14 steps. Also in content and number of symbolic or linguistic acts (as opposed to non-linguistic motor actions) numbers grew significantly, even in the three severely disabled children, who were observed to produce more interaction steps and the same percentage of symbolic acts than/as the group of children without additional handicaps in the 1977 study (in which the authors investigated oral-aural children)! This gives evidence to a much deeper and richer communication in bilingual families, as will be an issue at a later point in this paper.

*

²³ e.g., one step might be: calling the name of a communication partner, step two: he/she turns his/her head, step three: question, step four: answer, and so forth.

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Bilingualism appears to be beneficial to vocabulary growth (and presumably expansion of concepts – see Chapter 5) and communicative aspects of language. And since it must be regarded as the everyday reality for most deaf individuals (interacting with hearing speakers and deaf signers), Matthes (1996) argues that a bilingual approach is the appropriate form of instruction for deaf children to pave the way for early social integration, and as Pinter (1999) has demonstrated, this can successfully be practiced in a mainstream setting.

However, a more important factor on long term language development than the question of sign versus oral intervention appears to be a common communication basis with primary social partners: „Studies with children and their mothers show that language development depends on frequent, consistent, and accessible communication, regardless of whether it is through signed or spoken language“ (Marschark 2001, ii)

Its impact on particular linguistic systems will be drawn attention to in the following chapters.

3. Spoken Language, Aural and Oral Skills

There is much contradiction regarding the effect of sign language exposure on the development of spoken language in deaf children. Here are just two opening statements: “There is no evidence that the early use of signs hampers their development of spoken English. (...) Sign language may even provide a bridge to spoken English”(Marschark, 2001, ii).

But some of Europe’s most prominent authorities strongly reject this view. Morag Clark, for instance, the British pioneer in the Aural-Oral Approach, comments on her many years of experience with deaf children:

„I am working in eleven different countries world-wide and without exception can testify to the detrimental effect of the presence of sign language in the environment of a young deaf child at the language learning stage. As I observe programmes where sign is present, I am reminded of my early experience in old deaf schools, because of the poor quality of the children’s speech and spoken language. (...) Because of their placement in TC or Bilingual programmes, the children are so ‘visual’ that it is almost impossible to motivate them to use what hearing is there. This applies to both hearing aid wearers and cochlear implant children. Many with cochlear implants have test results that show that they are able to hear right across the spectrum, but their voices sound no different from those in the old pre-hearing aid days because they are dependent on the big visual signals afforded by sign” (Clark 2002, 1).

In a similar notion, van Uden (1976) claims that once deaf children were accustomed to signing, it would take increasingly more effort to motivate them to acquire and use spoken language, and Schmid-Giovannini (1976) referred to signs as an “emergency outlet”²⁴(p. 25) for those deaf individuals incapable of mastering spoken language. She has affirmed her view on this more recently (2001b; compare also Löwe, 1982).

Scientific evidence for this hypothesis is provided by a frequently cited study of Geers, Moog & Schick (1984), who administered their GAEL-S²⁵ test to 159 deaf children from TC programmes and 168 from OA²⁶ programmes in the United States to compare the students’ output of grammatical features in their spoken, (and in the case of the TC-children) signed and combined language. The children covered an age range of 5;0 – 9;0 years and were divided into four groups with an age span of one year each. All had a pre-lingual profound hearing loss, no additional handicaps, and received institutionalized early intervention in either of the two approaches (OA or TC). The institutions taking part in the study are all described as having been “recommended by several recognized authorities across the country” (p. 380) as excellent examples for their approach. All TC programmes systematically used a form of manually coded English (which maintains the inflexions and word order of spoken English). In the test, the

²⁴ Original quote: “Notventil” (translation by jh.).

²⁵ GAEL-S = Grammatical Analysis of Elicited Language – Simple Sentence Level. - A set of 21 activities and games constructed to elicit 94 target sentence structures found to be especially problematic for deaf children (Geers & Moog, 1978).

²⁶ OA = oral-aural

3. Spoken Language, Aural and Oral Skills

children are either prompted to imitate the target structures or are enticed to produce them in response to a pre-designed activity. All children were asked to use “their best speech and language” (ibid.) when responding. Each test run was videotaped and transcribed, marking deviations from the prompted structure on a formalized score sheet for (a) oral production of the OA group and (b) oral, (c) signed, and (d) combined production for the TC group.

Test mode	oral	signed	combined
Group			
OA-group	(a)	/	/
TC-group	(b)	(c)	(d)

An analysis of the results in respect to age and communication mode revealed that the oral production of OA children (a) contained equally many of the elicited grammatical features as the signed or combined production (c, d) of the children in the TC sample. This applied to all four age groups. Notably, however, the oral production of the TC group (b) was significantly below that of their manual and combined score (c, d) and equally below the OA score (a) in all of the probed grammatical categories! This clearly proves a considerable lack of spoken language in TC children, directly caused by the features of this particular approach. The authors argue that with these figures, TC proponents fall decisively short of what they promise, i.e. a language acquisition²⁷ more successful than in OA programs, and maybe even approaching the speed and quality of that in hearing children (e.g., Young, 1996). However, even the oldest children (age 9) in *both* samples performed far below regular hearing 4-year-olds! This indicates that *neither* approach has managed to activate the full language potential that has to be attributed to deaf children²⁸, when administered in the way they were in these particular programs, in 1984. I feel the need to stress this point, because it is common knowledge that professionals from all camps have learned to appreciate modern audio-technology (high quality hearing aids, CI, FM-systems, etc.) since then, which naturally affects the attitude towards and achievement in spoken language as well. In the discussion of their findings, the authors of the study themselves offer as one possible explanation for the deplorable oral skills of the TC children that in those programs auditory and speech training had not received nearly as much attention as in most OA programs.

In addition, 30 of the 159 children in the TC group had at least one deaf parent²⁹ and will most likely have received less spoken language input, in terms of quality and quantity, than the average deaf children born into a hearing family. This aspect, however, has not been investigated in the study.

In a general discussion of pros and cons of the approaches generally available in Great Britain (Oral-Aural, TC, and Bilingualism), Lynas (1994) weighs all arguments and reaches the following conclusions: (1) TC has not produced convincing evidence that spoken language can be promoted through the implementation of signs, (2) simultaneous communication (SC) is virtually impossible due to syntactic difference between spoken and sign language,

²⁷ Language in the general sense regardless of modality, but also and particularly oral (→ which is the distinction between TC and the philosophy of bilingualism).

²⁸ unless they are faced with additional handicaps.

²⁹ while all children in the OA sample had hearing parents.

3. Spoken Language, Aural and Oral Skills

available vocabulary, registers, and so forth, and (3) oral skills suffer invariably in a TC setting.

On the other hand, there are also investigations indicating that a growing competence in sign language strongly supports the growth of vocabulary, grammatical versatility and general communicative skills in spoken language and even have a positive effect on the articulation of speech (Fischer et al., 1991; Milosevic & Schwerdter, 1998; see also discussion in Wersich, 1992; Grosjean, 1998; Magnuson, 2000; and List, 2002). They share the view that deaf children growing up with sign language not only acquire this language, but also a strong and comprehensive foundation for a more successful spoken language acquisition. One of the reasons given for this is that lip movements derived from speech form an essential part of sign language³⁰ (Prillwitz & Wudtke, 1988, 85).

In the children of their own study, Prillwitz and Wudtke did in fact find noteworthy increases in oral skills: The children of hearing parents were well within the norm of active oral vocabulary as established by children in pure oral programmes (compare Chapter *Language Development*). “The nurses are certain that their spoken language development is absolutely comparable to that in the times of oral education”³¹ (S. 102).

In an overall comparison, they found that of the total number of signed communicative items, approximately one fifth was executed without lip movements, while the total of spoken words without some form of signs added up to one fourth³² (Prillwitz & Wudtke, 1988, 90).

They make amends by explaining that there is a certain potential for interferences in a bimodal language use: comparisons, adjectives of quality (e.g., running *fast*, *very* scared,...), conjunctions, and the like, that are expressed in sign language not through additional lexical items but through repetition, incorporation, facial expressions, size of motion, and so forth present possible ground for interferences of the two language systems. And in fact, they found that the children did mix some of these features or added whole spoken sentences to a single one-sign-phrase, but they argue that in general, these aberrations call for only minor corrections to form complete sentences in spoken German grammar (p.95). And they insist that a closer look always revealed a consistent linguistic logic followed by the children³³ and there was no sign whatsoever of a mixing-up of the different communication modes, let alone a confusion of the child³⁴ (ibid, p. 96).

One of the children (Tomas) observed in their study was found later to have enough residual hearing to transfer to a school for the hard-of-hearing and be raised strictly aural-orally. The parents reduced their application of signs systematically, which subsequently subsided in Tomas as well. His speech development was equal to that of his new peers and his parents and researchers valued the period of signing as having provided an effective means of

³⁰ This applies to DGS (Deutsche Gebärdensprache, which the authors are referring to) maybe more so than to some other sign languages.

³¹ Original quote: „Die Kindergärtnerinnen sind sich sicher, dass der Lautsprachaufbau völlig vergleichbar ist mit den Entwicklungen zur Zeit der rein oralen Erziehung“ (translation by jh.).

³² Again, in relation to the total number of signed communicative items.

³³ Mostly sign language word order or morphological rules (such as incorporation) applied to spoken utterances.

³⁴ Original quote: “von einer indifferenten Vermischung der verschiedenen Kommunikationsformen oder gar einer Verwirrung der Kinder war in keinem Fall etwas zu bemerken” (translation by jh.).

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communication until spoken language was extensive enough. The authors concluded that bilingual education does not impose a threat to a spoken language future in deaf children even when relatively good residual hearing is diagnosed. “Signed accompanied speech keeps open all opportunities. By guaranteeing effective communication, it gives direction to the spoken language development. This is not only so for the pragmatic and semantic dimensions of a child’s language development, but also for some crucial aspects of grammar and syntax in spoken language”³⁵ (Prillwitz & Wudtke, 1988, 86).

This is consistent with the observations of Hildmann (A., 2002) and myself as noted in Chapter 2.

After completing their study, Wudtke kept in touch with the ten students and informally observed their future development. Critical voices say that the great successes described in the report of 1988 were merely temporarily and that subsequently, the children had a less than fortunate future due to their bilingual exposure (Diller, 2002). However, such doubts need to be discarded, since Wudtke (2002) writes, that the great developmental successes presented in the 1988 report need not be modified retrospectively, since two of the children turned out to have sufficient residual hearing to leave the programme and transfer to a more orally oriented school for the hard-of-hearing (which might also have been somewhat due to the sign effect), three went on into higher education and partially received excellent grades compared to their hearing class mates, two kept a less close contact to the researchers but have also finished their school career successfully. Even two of the children with considerable additional handicaps proved unexpectedly great achievers. Only one student unfortunately did not have such a positive school and personal career, but Wudtke explains that this is most likely due to a foreign language family background and other aggravating factors not connected to the learning of sign language. He concludes: „As you see, all children with German speaking backgrounds and no additional handicaps have had very good school careers, are fully literate, bilingually competent and their speech is well understood by their hearing relatives“³⁶ (Wudtke, 2002).

Although this sounds very positive, it is always a variety of factors that attribute to the measure of academic and personal success a student reaches, so this can not be taken as a general warrant for bilingual education to yield such delightful results. Also, in regard to speech intelligibility, in most cases of deaf children, parents and close hearing acquaintances are much more likely to understand his or her speech well, simply due to habituation processes. This can not, however, be taken as an indication for good pronunciation or oral skills in general.

Marschark (2001) reviews several studies on a possible effect of signs on speech, and finds that in fact “ASL grammar sometimes intrudes into deaf children’s speech and writing” (p. 24), but that this is not to be judged unfavourably, since “such intrusion are common among children and adults learning a second language” (ibid.). He does not support his position with any

³⁵ Original quote: “Die LBG-Kommunikation hält gerade alle Möglichkeiten offen. Indem sie die Verständigung sichert, legt sie zugleich auch Orientierungen für die lautsprachliche Entwicklung aus. Dies gilt nicht nur für den pragmatischen und semantischen Aspekt des kindlichen Spracherwerbs, sondern auch für wesentliche Teile der grammatisch-syntaktischen Seite der Lautsprache“ (translation by jh.).

³⁶ Original quote: „Sie sehen, alle nicht mehrfachbehinderten Kinder mit deutschsprachigem Hintergrund haben eine sehr gute schulische Karriere gemacht, sind voll literalisiert, sind bilingual kompetent und werden von ihren hörenden Bekannten auch gut lautsprachlich verstanden“ (translation by jh.).

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solid comparison of data between these quite diverse populations, and I dare question that the occasional slip of grammar, choice of words or expressions in persons who are either equally fluent in two languages or temporarily focusing on a foreign language intensely enough to cause such interferences can be put into the same category as the systematic and persistent aberrations in “deaf talk” or “writing” that are being observed by about every teacher for the deaf and that are clearly caused by an internalized sign language and comparatively poor spoken and written language skills (Krausmann, 1998/99). So in this respect, sign language undoubtedly does have a negative effect on deaf children’s development – including all secondary consequences of poor literacy, restrained access to public information, disadvantages in education and profession, stigmata suggesting low intelligence, and so on. However, I find it important to emphasize, that I see the fault of this deficit not in the availability of sign language as such, but in a neglect of oral skills at the same time, and even more, in unfavouring and directional teaching methods³⁷ prevalent (in some poor schools up to now!) in deaf education, stressing enunciation and oral skills to an extent that by and large prohibits an imparting of knowledge in school subjects and thereby background knowledge and motivation for reading and writing (Fertig, 2001; Lentzen, 2002; Rüger, 2002).

Meadow, 1980 reviews an extensive body of literature on the impact of deafness on child development and issues as one of her conclusions, that „deaf children of deaf or hearing parents who use some simultaneous combination of signed and spoken English develop bimodal expressive language. Vocabulary growth, grammatical complexity, and syntactical structure all progress in the same way as for hearing children” (p. 42). However, in very most cases not at the same rate! – But which approach could boast to achieve this for all children under its tutelage? For a few sentences further, Meadow adds a second discovery from her review:

“Studies of the language of [deaf children whose parents use only oral English] at various stages make it clear, that acquisition is painfully slow. Linguistic retardation continues through adolescence and remains a factor for most deaf adults (ibid.)”. Although Meadow has written this in 1980 and much has changed to the better in Deaf Education since then, many (even young) adults will confirm this claim and suffer from poor literacy skills as well as poor language competence in general (for instance, Weinmeister, 2001; Lentzen, 2002; Randler, 2002; see also Krausmann, 1998/99).

*

Weighing all these indications, I personally am inclined to take a mediocre position, assuming the influence of sign language *can* be supportive to speech production in *some* children, as long as aural skills are paid a certain – presumably individually variable – amount of attention at the same time. I strongly doubt, however, that a profoundly deaf child growing up in a purely signing environment has even moderate chances to develop comprehensible speech. This would contradict everything that is known about the mechanisms and processes of early (spoken) language acquisition and the discussion on neurological sensible phases as discussed in the following Chapter.

³⁷ The issue and effects of directionality in interaction occur throughout this paper.

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From a more pragmatic point of view, it would appear a crime to test the validity of this hypothesis in an experimental situation, intentionally keeping deaf children from aural linguistic input. However, as it happens, Petitto (2001a) had a chance to observe hearing children born to deaf parents in Canada, growing up in a completely deaf community, which represents exactly the described setting. She found that these children developed regular speech and grammar after having entered a hearing school at around age 5.

But nota bene: These were *hearing* children, who had enjoyed general auditory stimulation, albeit not language specific³⁸. And CODA not seldomly have a delayed but eventually adequate spoken language capacity. In the case of deaf children, however, I half-way agree with Diller (1987), who argued that “signed communication can not attribute to aural education”³⁹(p. 185), because sign and sound are processed via two completely different systems. This leads us on to the question of neural processing of auditory versus visual input and oral versus hand motor output, respectively, that will be drawn attention to in the upcoming Chapter.

Although generalizations cannot be made for either side, plenty of examples appear in the literature viewed, that exhibit positive effects of sign language exposure on the spoken language development of deaf children. It has also repeatedly been described how the use of signs deteriorates by the degree they expand their spoken vocabulary, aural comprehension and communicative skills.

But if this is so, then how come that authorities in the auditory-verbal aural-oral and similar approaches so vehemently reject it (e.g. Schmid-Giovannini, 2001b; Klinke, Kral & Hartmann, 2001; Clark, 2002)? The only explanation I can imagine, is, that factors other than the linguistic system have influenced these cases, such as socio-emotional conflicts within the family, parents who pursued other goals than the best possible enunciation, and so on. However, this is merely a hypothesis.

³⁸ apart from input through TV, phone, the odd other hearing child or adult in the neighbourhood, visitors, and so on, that must have accessed this closed setting to a greater or lesser extent.

³⁹ Original quote: “gebärdensprachliche Kommunikation kann nicht zur Hörerziehung beitragen” (translation by jh.).

4. Neurophysiology

Neurophysiology, maturation processes of the human brain, neural processing of sensory stimuli... There is a seemingly endless list of such dry and complex topics scaring away many of the more practice-oriented educationalists. However, all sensations, all processes in receptive and expressive language, all cognitive functions and even much of our ‘deepest emotions’ depend on neural structures and their complex ways of interacting. In fact, functioning neural tissue presents the basis and means of most of what our body and mind attains, so it seems to me as merely the logical conclusion to pay tribute to this significance, and evaluate some publications on neurophysiology and deafness.

4.1. Maturation and sensitive phases of the brain

Maturation of the brain is partially genetically defined and partially dependent on external stimulation, and it progresses – in hearing children – in roughly three stages over a period of several years (starting prenatal): Building of axons (many more than will eventually be put to use), myelinisation (which can be compared to insulating a blank cable, and which increases the speed of transmission by the factor 10) and eventually the forming of synaptical contacts, which direct and distinct transmission of impulses and stimulation of neurons. Throughout the entire development, these ‘neural highways’ are strengthened by means of exercise (i.e. processing of external stimulation), which also determines which of the axons are ‘useful’ and need to be enhanced in speed and direction of transmission. (Klinke, 1997, 1998, 2002). These neural processes set off and end at different ages according to the niveau of sensory stimulation at a particular neural site: “In the hierarchically higher areas of the acoustical nervous system, the myelinisation lasts until age four”⁴⁰(Klinke, Kral & Hartmann, 2001, 3050), but the authors suggest that under early auditory deprivation, these time frames are somewhat prolonged and a certain neural plasticity remains, albeit one that decreases with age.

However, after a few years into childhood⁴¹, inefficient and unused axons are begun to be disintegrated. Even already existing synaptic contacts are eliminated eventually if they are not exercised over a long enough period of time. This is why medical and educational experts frequently demand early auditory stimulation to make the most possible use of these *sensible phases* (Szagun, 1996; Klinke, 1997, 1998, 2002; Diller, 2000, 2002).

In experiments with congenitally deaf cats, who were implanted with a CI, Klinke et al. (2001) proved that the duration of total auditory deprivation correlated indirectly with the size of the activated cortical areas. But it remains a

⁴⁰ Original quote: “In den hierarchisch höheren Bereichen der Hörbahn beansprucht die Markreifung⁴⁰ einen Zeitraum bis zum vierten Lebensjahr“ (translation by jh.).

⁴¹ Scientists are still arguing on when exactly these stages and processes begin, terminate and have their peaks. It appears that there is great individual variance which calls for this vague terminology here and in the following statements. I am assured that future research will shed some light on all of these questions.

question to what extent these undoubtedly impressive findings also apply to humans. Certainly, our sensitive phases are longer than those of the cats (which were up to 6 months of age!). On the basis of measurements of acoustically evoked potentials in children, they suggest that the central auditory system has not fully matured until approximately eight years of age (ibid., p. 3052). But varying figures exist (Klinke et. al 2001), and as the same group of researchers states in a different publication, „it is hard to nail down the exact time frame of these sensible periods in humans, but there can be no doubt about there general existence“⁴²(Klinke, Kral & Hartmann, 2001, 3051).

The question then is, what kind of positive or negative impact will bilingual education have for the maturation and specialization of these neural processes in deaf children?

It has often been argued that there is no positive use in exposing young deaf children to sign communication and rather focus on promoting an ‘aurally oriented personality’ in them (e.g., Diller, 2002), because one can not learn to hear once the central sensitivity deteriorates, while sign language can be acquired quite well in later years, as is given living proof for by many deaf adults raised orally. Therefore, there need be no fear that this visual *window* closes, unlike the auditory sensible phase, which – no matter how long in general or in any individual case it actually lasts – will definitely diminish eventually (i.e. synapses will degenerate irrevocably) if aural input is not provided in the necessary degree and with linguistic features, as discussed previously (Schmid-Giovannini, 2001; Clark, 2002; Broesterhuizen, 2000; and others).

However, different issues are thrown together in such an argument, namely that obviously the visual channel, being as intact in deaf as in hearing individuals can easily be stimulated in early and later years. But this kind of general stimulation (e.g. learning to perceive visual patterns) is much different from linguistic interchange (with all its cognitive and socio-emotional aspects), and it has repeatedly been reported that *late-signers* do not acquire sign language to the same degree as *early-signers* (mono- and bilingual ones) (compare Broesterhuizen, 2000; and others).

For the visual system, different ages of peak sensitivity for various aspects (tracing, perception of patterns, visual search, and so forth) have been reported, a full maturation is estimated not until the second decade of life (Beteleva, 1993, as cited in Broesterhuizen, 2000, 30f). Broesterhuizen concludes from this: „The slower maturation of the visual system might lead to a likewise longer sensitive phase for a sign language acquisition“ (ibid.). The still considerable achievements of late-signers – compared to the average aural gain in late CI-implanted children – support this view. Broesterhuizen even goes a step further, calling for much more research in this area and questioning whether there might even be different sensitive phases for different aspects of sign language (e.g. phonology, semantic, syntax), as is the case for spoken language. No answer can be given for this at the time being.

But according to Petitto’s (2000; and Petitto et al., 2000, 2001a) theory of one sensible phase for language in general (which means: regardless of modality), the differences in achievement of early and late signers are not due to modality constraints but to language deprivation during those crucial first years. By now, many are convinced of a strong *plasticity* of the brain in contrast to distinct phases of sensitivity and defined areas of functioning (e.g. Broesterhuizen, 2000)

⁴² Original quote: „die genaue zeitliche Bestimmung der sensiblen Perioden beim Menschen ist schwierig, an deren Existenz ist aber nicht zu zweifeln“ (translation by jh.).

4.2. Is there a cerebral specialisation for spoken language?

Opponents of sign language have often made the claim that script and sign are viewed to have “noticeable capacities” but be nevertheless ‘surrogates’ (Klinke, Kral & Hartmann, 2001, 3049): „The human central nervous system is designed to analyse and produce spoken language “ (ibid., 3052).

Usually connected to this belief is the conviction, that sign and spoken language enter a competition for the cortical areas and thus language acquisition: „The self-organisation of the brain for the acquisition of optimal problem solving strategies⁴³ should not be hindered through the competition of different accesses to language. This speaks against the implementation of a sign language while nurturing spoken language. Else, the consolidation process of the synaptical interconnections will be hindered. Higher cortical areas of the central nervous system will even be competed over (...)“ (ibid., 3052).

This conviction is widely spread, not only among neurologists, but also in audio therapists: „The brain is set for [spoken language], not for signs – that doesn’t start until much later, that a child starts to imitate signs. But the hearing we can nurture so very far until then! And if we then resort to bilingualism, with a baby, then we miss out on the most important developmental phase for the hearing. And there is no justification for that”⁴⁴ (Schmid-Giovannini, 2001a).

This might be well founded in informal observations. However, Petitto et al., (2001a) traced the language development of six hearing bilinguals (three bimodal with LSQ⁴⁵ and French; and three monomodal with spoken French and English) and found that they „achieved their early linguistic milestones in each of their languages at the same time (and similarly to monolinguals), [and] produced a substantial number of semantically corresponding words in each of their two languages from their very first words or signs (translation equivalents),”... (p. 454).

Now, if the competition-hypothesis were correct, these bimodal bilingual children would not have been able to keep up with the language development of monolinguals and the monomodal bilinguals.

One has to keep in mind that the subjects for this study were hearing, but it can hardly be reasoned, that the cerebral structures of a deaf child are any different at birth– such a claim would be nowhere tenable in view of neurological and psychological findings and the plethora of causes and types of deafness, that cannot have an impact on the basic neurological constituents.

So symptoms of ‘competition’ or less advantageous development Schmid-Giovannini or others might observe, have to be caused by other factors, such as a lack of motivation for speech in signing children, as has been argued by Clark (2002) (see previous chapter).

4.3. Processing of sign and spoken language

Since what we generally call ‘the ear’ is merely a sensory organ, converting sound waves into electric impulses and transmitting them to the brain, and since therefore, all ‘actual hearing’ and language processing takes place in areas not primarily impacted by the causes of deafness (Klinke, 1997, 1998, 2002), it could

⁴³ The authors do not further elaborate on what kind of *strategies* and *solutions* are meant.

⁴⁴ Original quote: „Das Gehirn ist nämlich [für Lautsprache] bereit, nicht für Gebärden. Das kommt erst viel später, dass ein Kind Gebärden nachmacht. Aber das Hören, das können wir in dieser Zeit schon *so* entwickeln! Und wenn wir uns da auf Bilingualismus verlegen, beim Baby, dann verpassen wir die wichtigste Phase für die Entwicklung des Gehörs. Das können wir doch gar nicht verantworten“ (translation by jh.).

⁴⁵ LSQ = Langue des Signes Québécoise - used in Québec and other parts of French Canada.

be inferred that signed and spoken languages are processed in exactly the same manner and cortical areas. However, this would be neglecting the essential fact that they are of totally different modalities: spoken language is passing through the primary and secondary auditory cortex before entering the Wernicke centre of receptive language, activating the Broca centre of expressive language and parts of the cortex responsible for vocal articulatory motor activity. Naturally, other areas are stimulated simultaneously, e.g., for association and memory. As mentioned above, specialists have by now abandoned the theory of distinct cerebral areas with strictly separate functions and come to share the view of a *plasticity* of the brain: A network of regions facilitating certain processes that can be put to use and interconnected in various ways and for multiple purposes (Poeck, 1995). “Cerebral dominance is not a state but a process, and one that continues through life” (Brown & Jaffe, as cited in Nöth, 1994, 285). And this, Nöth adds, applies not only to lateralization but also to intra-hemispherical differentiation of cognitive sub functions.

This would explain the contradicting findings of activity in patients⁴⁶ with aphasia (Poeck, 1995; Hickok, Bellugi & Klima, 2001; and others), which are not contradicting as such but merely reflecting different processes that have been co-activated in different tests (compare the discussion in Günther, 1990).

It is by now broadly accepted that spoken and signed languages are processed centrally in the same regions (Nöth, 1994). However, it remains a question at which point the two paths merge (in reception) and when they part (on their production path), since the fact remains that a visual language will not be perceived via the auditory path ways – and vice versa.

4.4. Sensory compensation and plasticity of the brain

According to Nöth (1994), there are two different types of compensatory effects: (a) *compensatory hypertrophy*, which means that higher neural activity was observed in the visual cortex of deaf compared to hearing individuals, and (b) *functional reallocation*, which implies that cortical areas believed to be specialized for processing auditory input are in case of deprivation (i.e. deafness) partially ‘taken over’ by visual and other functions.

The latter issue has been investigated by Petitto et al. (2000), who exposed 11 profoundly congenitally deaf native signers⁴⁷ (5 of ASL, 6 of LSQ) and 10 hearing controls of no prior knowledge of sign language to five particular experimental conditions to investigate cortical areas of increased cerebral blood flow⁴⁸ when working on lexical and sub lexical language tasks in sign. Preconditions for all subjects were a minimum of high school education, no additional neurological or cognitive impairment, right-handedness, and an equally high language proficiency (in their native language) for all participants, as established in pre-tests.

The five test items were:

- (1) Passive visual fixation
- (2) Passive viewing of nonsense-signs (i.e. complying to linguistic criteria, but without meaning)
- (3) Passive viewing of meaningful lexical signs (i.e. equivalents to spoken words)
- (4) Trying to imitate a series of (other) meaningful lexical signs
- (5a – for deaf subjects) Generating signed verbs from presented signed nouns

⁴⁶ hearing and deaf

⁴⁷ i.e. they all learned sign language as first language from their deaf parents and home environment.

⁴⁸ as indicator for increased activity in the concerned cortical regions.

(5b – for hearing subjects) Generating spoken verbs from presented written nouns. These tasks were chosen because according to the authors, “their specific cerebral activation sites are relatively well understood in spoken languages and, crucially, their neuro-anatomical activation sites are thought to be uniquely linked to sensory-motor mechanisms for hearing and speaking” (p. 13962).

Each test had 13 trials and the entire presentation was repeated once per subject with new stimuli in the second run. Five of the hearing individuals viewed the ASL version, five the LSQ version of the presentation. This led to a total of four experimental groups. Analyses and comparisons of the various results demonstrated distinct bilateral temporal activity in deaf subjects when processing linguistically organized phonetic stimuli (subtests 2 to 5a) – more so than hearing subjects processing spoken language. But, as had been expected, these included regions of the right hemispherical visual cortex, which, interestingly enough showed very similar activation patterns among hearing and deaf subjects in this study.

Anatomical mapping demonstrated that the neural activation in the deaf subjects falls posterior to where the primary auditory cortex is expected, while the secondary auditory cortex was unmistakably covered. This region was hitherto believed to be responsible for the search and retrieval of information about spoken words. And since the sign presentations did not yield these same activations in the hearing adults (who were not familiar to the lexical and sub lexical phonetic units in the signs), the authors suggest that this cortical area might be not, as hitherto believed, exclusively designed to process auditory input. “We have demonstrated the recruitment of what was hitherto been thought to be unimodal auditory cortex with purely visual stimuli” (p.13966). Instead, they suggest, it might be originally sensitive to polymodal linguistic stimulation or dedicated to processing specific distributions of complex, low-level linguistic units, independent of sound or sign. A specialization for a modality would then occur later and according to whatever access way is frequented most.

Alternatively, they suggest, the auditory cortex might undergo functional reorganisation under auditory deprivation and sufficient meaningful linguistic visual input (compare Nöth, 1994, above, on *functional reallocation*).

In a critical query of these assumptions, Caplan (2000) argues that the increase might have resulted “from any or all of the operations involved in perceiving a word, understanding it, retrieving an associate, and pronouncing the associate. To complicate interpretation, many of these operations are not even purely linguistic, such as switching from one category (a noun) to another (a verb), or verifying that the response is from the appropriate category” (p. 13476f). He notes that the two explanations Petitto and her colleagues offer are quite contradictory and that further research will be necessary to shed some light on this. Nevertheless, he agrees with the findings in that “the function carried out by what is widely thought of as auditory association cortex needs to be reconsidered” (Caplan, 2000, 13477).

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From a neurological point of view, modern evidence substantiates that there is no competition for areas of language processing among spoken and sign language. Quite contrary, the plasticity of our brain is obviously much greater than has always been thought, and „regardless of structural differences that can be found between signed and spoken languages, much (...) supports the view that the primary acquisition of a sign language also facilitates the access to a spoken language“ (Nöth, 1994, 301).

But much further research will be needed to find out to what extent this flexibility and unity goes. Maybe all the areas hitherto thought to be modality-bound are merely perceptible to underlying patterns and rhythms that are simply produced most by one particular sensory path way, but could actually be activated via any other sense as well (- just a wild hypothesis!).

Also, it will have to be investigated, whether a competition takes place in, for example, the secondary auditory cortex, when it is stimulated by spoken and sign languages simultaneously (in bimodal hearing and deaf bilinguals). This – as a personal remark – would quite surprise me, since CODAs seem to have no noteworthy difficulty in (a) word finding and lexical comprehension compared to monolingual or bilingual individuals with two spoken languages, and (b) visual association, which would be the counter effect of stimulating the secondary visual cortex bimodally.

However, to my knowledge, no study has dealt with this question yet.

Poor development of spoken language in many deaf children is undeniable, but certainly a better remedy than to blame sign language for this deplorable state would be the introduction of universal newborn screenings, which up to now – shamefully – are lacking in many countries (including Germany!), and an improved conscience of auditory stimulation in bilingual and TC-settings.

5. Cognitive Development

The term *cognition* comprises quite a number of mental functions and processes enabling us to gain knowledge of ourselves and our surrounding. In particular, these processes include: Perception through sensory organs, representation and imagination of previous such perceptions, a memory allowing their retention and recall, thinking, judging, and problem solving (i.e. higher and more complex psychological functions), and learning (i.e. acquiring knowledge through combined means of the previously listed processes) (Prillwitz, 1982, 16).

If we disregard the first wave of intelligence tests administered to deaf children because of their heavy reliance on spoken language⁴⁹ (see the discussion in Wood, 1991), then a comparable distribution of (nonverbal) intelligence is reported by many authors (e.g., Krüger, 1987; Ahrbeck, 1992; Scheetz, 1993). „Deaf and hard-of-hearing children have essentially the same distribution of intelligence as the general population, even though the mean score for deaf children may be slightly below that for hearing children” (Meadow, 1980, 47). To understand this statement correctly, it has to be taken into consideration that a certain percentage of cases in deafness occur within a more complex physical condition or syndrome that is also causing some degree of mental retardation. Also, it is necessary to distinguish between nonverbal and verbal intelligence, latter of which is in fact significantly delayed in many hearing-impaired children and – to a lesser extent – adults (Krüger, 1987). This fact I find extremely important to investigate closely for its causes.

Scheetz (1993) argues that the gap of IQ scores between the average hearing and the vast majority of deaf students originates from a complex interdependence of multiple factors, most of which can be explained by the communicative barriers faced by deaf individuals and their hearing environment (see also Krüger, 1987; and others).

Wersich (1992) explains that when discussing the role of language in the cognitive development in children, it is essential to distinguish between its *linguistic* and its *social-communicative* dimension. Language in its linguistic aspect is a “second signal system” (Pavlov, as cited in Zander, 1978, 35), facilitating representation and simplification of multi-modal perception complexes⁵⁰ in order to retain and transmit them to others. By itself, however, it is not a driving force to cognitive advance of an individual. Through communicative interaction among members of a cultural group, on the other hand, these concepts are generated and mentally stored in semantic connection with various situative contexts.

Wersich (1992) conducted a study designed to investigate the impact of effective social interchange on the cognitive development of deaf children. She argues that - in accordance with Piaget (1988) - next to genetically determined maturation processes, two access paths to concepts and learning decisively contribute to cognitive growth: (a) functioning right from birth through sensory-

⁴⁹ which naturally devastated their validity, since they did not measure intelligence but spoken language competence, which obviously was inferior in deaf children compared to that of hearing controls!

⁵⁰ i.e. labelling a concept

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motor experience⁵¹ and nonverbal or paralinguistic cues⁵², and (b) through exchange of linguistic symbols⁵³ in social interaction⁵⁴.

To test this hypothesis for validity, Wersich administered an especially composed *game battery* to three groups of children: (1) 28 deaf children of hearing parents (DH), (2) eight deaf children of deaf parents (DD), and (3) 30 regular hearing children of equally such parents (HH⁵⁵).

DD- and HH-families (group 2 and 3, respectively) can be expected to have a mutual and effective communication system at their command, while orally raised DH (group 1) are generally found to lack such a proficient early communicative basis. Therefore, if Wersich's presumption was correct that even in families without an effective means of communicating all children (group 1, 2, and 3) will acquire concepts that can be transported wholly via path (a), while knowledge that relies mainly on explanation and experience from social interaction (access b), the average cognitive development is likely to be similarly adequate in group 2 and 3 but significantly delayed in the DH group (1).

All subjects in this study were aged 4;0 to 7;0, attended German nursery schools⁵⁶, had no diagnosed additional handicap, and came from German speaking families – to exclude possible interference factors. Further data on the three groups can be found in table 1 below.

Group	N	Average hearing loss ⁵⁷	Parental hearing status	Average age (in yrs.)	Age span (in yrs.)	sex
1	28	99 dB	hearing	5;7	4;1-7;0	13f, 15m
2	8	95 dB	deaf	5;10	4;7-6;8	5f, 3m
3	30	/	hearing	5;3	4;0-6;6	18f, 12m

(Table 1, taken from Wersich, 1992, 87).

Each child was tested individually⁵⁸ and parents and nursery school teachers were asked to fill out questionnaires on their impression and observations on a particular child.

The material for the nine games probing different cognitive abilities (association, categorization, logical inference, serial analytical thinking, counting, coordination, and the like) was taken from already available tests, commercial games for pre-schoolers, and mail-order catalogues. For details on each game and exact results, please refer to the original source where they are thoroughly documented.

The overall finding made evident – although individual deviances did occur – that the cognitive structure and world view was comparatively high in groups 2 and 3, where (regardless of modality) a functioning communication system was

⁵¹ I.e., sensory sensation, practical, physical handling

⁵² Pointing, facial expressions, crying, and so forth

⁵³ Here: spoken or signed language

⁵⁴ Just for completion, the fourth factor: The 'system' *child* constantly strives to bring these three factors (maturation, material and social experience) into a balance (*equilibrium*).

⁵⁵ HH: Hearing children of hearing parents

⁵⁶ Group 1 and 2: special (orally oriented) institutions for the deaf, group 3: regular hearing kindergartens.

⁵⁷ Of the better ear

⁵⁸ The entire test took approximately 70 to 110 minutes and was conducted in two to three sittings, depending on a child's concentration and cooperation.

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established within the families. In children of group 1, on the contrary, it was found to be “comparatively delayed and developed only fragmentarily”⁵⁹(p.177). Concepts and world knowledge that could be acquired entirely by sensory-motor activity, observation and transfer, was not or merely slightly deviant in the ‘communicative impaired’ children of group 1, whereas tasks requiring abilities and knowledge mainly relying on explanation through adults demonstrated more significant arrears. Based on these findings, Wersich reaches the conclusion that “a purely oral education has significantly bad impacts on the cognitive development of deaf children – exceptions admitted. My study demonstrates that retardations and knowledge gaps become evident already at a very age and can be traced back directly to a restricted social-communicative exchange”⁶⁰(p. 182f.).

This is in total accordance with Prillwitz (1986) who reflects on his experience with the bilingual approach and insist that a ‘non-egocentric’ or ‘over-adjusted’ intelligence through spoken language alone is not or merely insufficiently possible (p. 86).

However, it has to be kept in mind that Wersich specifically chose as subjects deaf children rated (by parents and care-takers) as not drawing much benefit from spoken language. Naturally, this basically predicts her findings and narrows the implications for deaf education. It also has to be kept in mind that in recent years, technical and medical advances have greatly increased the number of purely orally raised hearing-impaired children who successfully acquire spoken language to a degree that is in quality and quantity hardly lacking behind hearing peers.

Nevertheless, her findings are consistent with the discoveries of Jamieson (1994) who investigated the interaction and instructional behaviour patterns of 3 sets of mother-child dyads: HH, DH (raised oral-aurally), and DD, with the children ranging in age from 4;9 to 5;5. She found that the OA children had much greater difficulty completing the task taught by their mothers (i.e. to assemble a block pyramid), “partly because, no doubt, only the visual portion of the mother’s instruction was actually received” (p. 443). The visual portion of the instruction consisted merely of manipulating the blocks, all explanations on a purposeful proceeding, and even the intended goal of the activity was issued in speech only. When the child hesitated or made mistakes, the mothers resorted to repeating their instructions and merely added pointing to particular blocks and more grossly manipulating them as additional (visual) aid. Jamieson claims that these mothers “did not appear skilled in adapting their teaching approaches to accommodating their child’s need to have instructions delivered visually” (ibid, 443). Therefore, to use Wersich’s terminology, this clearly demonstrates that access path (a) functions as expected, whereas the linguistic, communicative pathway was largely insufficient in dyads where no effective shared language base was established.

The interrelation of cognition, language, and communication with special regard to deafness has been a topic in many publications (for example, Diller, 1987; Wersich, 1992; Ruoff, 1994). And other authors as well find that rich

⁵⁹ Original quote: „vergleichsweise verzögert und fragmentarisch entwickelt“ (translation by jh.).

⁶⁰ Original quote: „eine rein oralistische Erziehung Gehörloser wirkt sich – von Einzelfällen abgesehen – negativ auf ihre kognitive Entwicklung aus. Meine Untersuchung erbringt den Nachweis dafür, dass sich Entwicklungsverzögerungen und Wissenslücken schon in einem sehr frühen Alter zeigen und sich direkt auf einen eingeschränkten sozial-kommunikativen Austausch zurückführen lassen“ (translation by jh.).

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interaction with primary care-takers who are making use of manual communication forms are particularly beneficial to the cognitive development of deaf children (e.g., Krüger, 1987, 59).

Grosjean (1998) explains in the light of this subject: “The child acquires world knowledge mainly through language. Communication with its parents and relatives, with other adults and children allows for acquisition and transfer of knowledge. This forms the indispensable foundation for school instruction. Also, in return, increasing world knowledge facilitates language comprehension, since there is no true comprehension without sufficient world knowledge”⁶¹(p. 1).

And Prillwitz (1986) gets even more specific when he elaborates on the effects of bilingual education: „It is getting increasingly normal that children can adopt and reason for a viewpoint. This in return leads to parents giving explanations for their demands, which we hardly observed in [the pre-intervention study of Prillwitz et al in] 1977. Events and expectations become thereby predictable for the child. The explanations of parents with three-and-a-half-year-olds today are similar to those offered by parents of five-year-olds with good residual hearing and better speech in the 1977 study. (...) The day becomes interpretable through language, which enables the children to also make references to past and future events”⁶²(p. 104).

These interaction difficulties observed in oral DH-families have been argued to lead to a very restrictive and directive style of instruction by parents and teachers of deaf individuals⁶³, up to the point of mere physical manipulation (without explanations for the child to create meaning or extract rules for behaviour) (Scheetz, 1993; Wood, 1991), which in turn has been proven to have a negative effect on problem solving ability, creativity, communicative expression, and other higher cognitive abilities (Martin, Craft & Sheng, 2001; Wood, 1991). “Such negatively deviant socialisation effects are often closely intertwined with the quantitatively and qualitatively restricted means of communication of parents and their hearing-impaired child”⁶⁴(Krüger, 1987, 54).

Upon change of interaction style, instructional behaviour or even explicitly teaching meta-cognitive skills to deaf students as is exercised in many hearing

⁶¹ Original quote: “Das Kind erwirbt Wissen über die Welt größtenteils mittels Sprache. Kommunikation mit seinen Eltern und Verwandten, mit anderen Erwachsenen und Kindern erlaubt ihm Erwerb und Übertragung von Kenntnissen. Diese wiederum bilden die unentbehrliche Basis für die Schule. Auch erleichtern sie ihrerseits wiederum das Sprachverstehen, denn es gibt ohne Kenntnisse über die Welt kein richtiges Verstehen“ (translation by jh.).

⁶² Original quote: “Es wird immer normaler, daß das Kind einen Standpunkt einnehmen und begründen kann. Das führt wiederum dazu, dass Eltern ihrerseits ihre Aufforderungen begründen, was wir 1977 kaum angetroffen haben. Ereignisse, Erwartungen werden so für das Kind vorhersehbar. Die Erklärungen der Eltern bei den 3,5 Jahre alten Kindern ähneln heute denen, die Eltern in der Studie von 1977 fünfjährigen Kindern mit guten Hörresten und besserer Lautsprache gegeben hatten. (...) Der Tag wird sprachlich interpretierbar, was dazu führt, dass öfter auch die Kinder auf vergangene und zukünftige Ereignisse Bezug nehmen“ (translation by jh.).

⁶³ This situation is comparable to foreigners asking us for information at a train station. We enunciate more clearly, cut our sentences short and restrict our choice of words to the simplest possible code. And this does not even have to be meant discriminatory, it is simply what we do to facilitate communication under complicated conditions, and which – on a short term basis – does in fact help the foreigners in this case, as well as young deaf children, as a “scaffolding” to expand linguistic comprehensive and expressive structures (see Gallaway, 1998, 55).

⁶⁴ Original quote: “Derart negativ abweichende Sozialisationseffekte hängen eng zusammen mit den quantitativ und qualitativ eingeschränkten Kommunikationsmöglichkeiten zwischen den Eltern und ihrem hörgeschädigten Kind“ (translation by jh.).

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classes, the attained level of reading comprehension (Strassman, 1997), mathematical concepts, applied problem solving strategies, structure of working process and socially appropriate behaviour rose significantly (Martin, Craft & Sheng, 2001; Heiling, 1995).

If directionality – as has been suggested in many studies – hinders the development of meta-cognitive strategies, than this will have negative effects on cognitive growth, independent learning and social maturation. And hearing adult – deaf child interactions without visual aid through some form of signs appears to grossly provoke directionality (Wood, 1991, Jamieson, 1994; Spencer & Gutfreund, 1990). And if this is so, it appears to be a definite indication for the opening to signs in deaf educational settings.

Jamieson even implies that directionality⁶⁵ in instruction – although it may be helpful in some ways – also impairs the establishment of inter-subjectivity, which is the pre-step towards intra-subjectivity, vital for the expansion of cognitive structures (Jamieson, 1994, 447). “The tendency of the hearing mothers to use one-way, instead of reciprocal, communication with their deaf children rendered the children’s feedback less effective than it might otherwise have been. This suggests that it is the response of hearing people to deafness, rather than deafness itself, which contributes to the deaf child’s learning difficulties”(Jamieson, 1994, 447; see also Wood, 1991).

Put to extremes, it appears that oral-aural DH-parents are less successful in instructing their deaf child than HH and DD, but that basically all deaf children needed the additional visual input to successfully comprehend and complete a task explained to them. Obviously, the latter cannot be true, since many living examples of deaf adults raised in an aural/oral or auditory-verbal setting give evidence to the contrary (see, for instance, Schmid-Giovannini, 2001a/b, 2002; Clark, 2002, LKHD).

*

Having read all these papers, it appears to me that everybody, who makes an effort to conduct research on the influence of bilingual exposure on the cognitive development of deaf children is delighted by the findings. Not a single study reviewed by me reports a negative effect on cognition: „There is nothing to indicate that the combination of signs and speech mitigates the development of concepts“ (Magnuson, 2000, 13).

I find it highly surprising then that there is still a vast number of educationalists and schools vehemently opposing the systematic application of signs in their instructional practice. After all, cognitive growth is one of the prime objectives of education – the others being (put roughly) socio-emotional maturity and language competence, both of which seem to profit from a thoroughly conducted bilingual approach as well.

This actually being the closing remark for this chapter, I feel the need to present some findings on one particular focus in the field of cognition that has received astonishingly much attention from various researchers:

Memory and Coding Strategies

⁶⁵ independent of modality or hearing status

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Hearing persons tend to code spoken linguistic items according to their linguistic component (i.e. similar sounding words are associated and can be memorized more easily). Likewise, deaf signers store signs into their short-term memory rather according to linguistic than according to semantic criteria or degree of iconicity⁶⁶. This is evidenced by the types of mistakes, deaf signers make when asked to recall a list of items previously presented to them: signs of similar phonological aspects are confused, signs that are merely semantically related rather not (Boyes Braem, 1995, 39f).

Marschark, Lang and Albertini (2002) argue that signers employ different coding strategies compared to speakers, and that each type seems to have minor advantages for certain selective tests, but that no overall divergence in everyday practicability can be found.

Further interesting literature on memory and communication methods was at hand but could not be considered due to temporal restraints. Nevertheless, it appears to be evident that a regular use of sign language promotes other coding strategies than spoken language. Both sorts, however, seem to have their benefits in certain types of memory tasks, but no significant overall advantage over the other mode. And there is of yet no research – for example with CODA – investigating whether an early bilingual acquisition of sign and spoken languages leads to interferences or a mutual advance in the respectively other coding strategies.

⁶⁶ Iconicity: Signs can be iconic (i.e. recognizably depict or directly refer to their conceptual content), half-iconic (the reference between sign and content is not overtly clear until the concept is identified in other ways) and non-iconic (or abstract, the connection between sign and content is not visually comprehensible, even when content is clear) (compare Boyes Braem, 1995, 35).

6. Literacy

Competence in literacy is one of the main objectives in institutionalized general education⁶⁷, since much cultural and academic information is transported through print. It is also a matter of great importance in telecommunication in our rapidly progressing information and network society and offers new possibilities of communication and easy access to knowledge for the Deaf (List 1990; Erbe, 2001). So, “if the reading program in schools for the Deaf is successful, deaf children will gain an invaluable tool for enjoyment in life” (Hart, 1978, viii).

It is no surprise then that in research and practise, this area has received a great deal of attention. And deafness renders a particular impediment to this process: Written language can most easily be accessed via solid knowledge of its spoken equivalent, since in most languages, a more or less distinct grapheme-phoneme correspondence exists that can function as an effective bridge from the home language (e.g. spoken English) to its written component (written English, respectively) (Mayer & Akamatsu, 2000; Paul, 1992). Profound deafness, however, often inhibits the acquisition of spoken language to strongly for it to function as a solid L1⁶⁸ base for the reading process.

It has often been reported that the level of literacy in the vast majority of deaf children is at best miserable, despite professional intervention measures (Meadow, 1980; Wudtke, 1990; Scheetz, 1993; Marschark, Lang & Albertini, 2002). Deaf adults’ reading and writing level is often merely comparable to that of hearing fourth graders (Meadow, 1980; Csányi, 1982; Paul, 1998; and others).

To what extent is this the fault of exposure to sign language – since this system has a different syntax than spoken languages and might therefore cause interferences? Contrarily, can it maybe provide an effective remedy to this deplorable state of affairs? Or is the lack of literacy skills in deaf children caused by factors completely independent of the modality of their prime language? Let us look at some empirical findings to answer these questions.

Various theories and approaches to literacy exist in the three rough categories *top-down*, *bottom-up*, and *interactive* (for a discussion and details, see Paul, 1992). Paul (1992) himself argues, “the mature reader derives information more or less simultaneously from many levels of analysis including graphophonemic, morphophonemic, semantic, syntactic, pragmatic, schematic, and interpretative” (p. 80). So, since reading is always an interactive process more or less transporting and relying on cultural issues, students need to bring linguistic competence (bottom-up) and general world knowledge (top-down) with them to become good readers. While linguistic decoding is necessary to visually recognize and construct words quickly, world knowledge is what guides a reader in making more accurate guesses, predictions, interpretations of words with multiple meanings, and in making general *sense* of a text. Both have to be present to some extent (the more the better!) *before* attempting to read: “An adequate knowledge

⁶⁷ As two of the famous ‘3 Rs’ (Reading, Writing, Arithmetics).

⁶⁸ L1 = first language

of the world and, specifically, the language in which one is trying to read are important prior to beginning reading” (ibid, 77).

Already at this point it becomes evident that several factors attribute to developing literacy, not all of which are related to modality issues:

6.1. Linguistic competence.

The probably most frequently cited publication on this topic is that of Strong and Prinz (1997), which is why I will introduce it in some detail.

Their study was conducted with 160 deaf students, aged 8 to 15, attending an American residential school for the Deaf. Younger children were exempt because their literacy skills were unlikely to fulfil the research criteria, whereas students beyond age 15 were expected to leave school – and therefore the programme – during the three year study period. The children had no additional handicaps and were divided into four cross-subgroups: age 8-11, age 12-15, children of deaf mothers (DD, in most cases two deaf parents), and children of hearing mothers / parents (DH). Sign language skills and literacy levels were assessed using the following measurements:

ASL competency was examined through two sets of tests which Prinz and Strong report to have designed and validated earlier (as Prinz & Strong, 1994). The first set comprised two tests on expressive ASL command, namely on *classifier production* and *sign narrative*, and grammatical and narrative skills in retelling a story. The second test series examined ASL comprehension skills with subtests on story comprehension, classifier comprehension, and familiarity with signs indicating temporal information and directional descriptions.

To evaluate the students’ level of English literacy in the aspects comprehension, production, syntax and written narrative, selected subtests of two already standardised tests⁶⁹ were conducted.

The authors calculated a mean value of ASL fluency and of English literacy for the overall population and each subgroup separately and elicited correlations between ASL and literacy for each of them. Subsequently, all children were grouped according to their ASL fluency into *high*, *medium* and *low*. The question investigated was whether students with higher ASL fluency also produced higher literacy scores compared to low fluency students.

The results were as follows: For the overall population, it became evident that each ASL group significantly outperformed the lower group(s) in literacy skills (i.e. medium fluency group beat low and high fluency group beat medium and low).

For the cross-subgroups, the results in Table 2 were yielded.

Maternal hearing status		
Age	Hearing mothers	Deaf mothers
8 – 11 years	<i>high</i> and <i>medium</i> ASL fluency group outperformed <i>low</i> fluency group	Not significant.
12 – 15 years	<i>high</i> and <i>medium</i> ASL fluency group outperformed <i>low</i> fluency group	Not significant.

Table 2

⁶⁹ The revised version of the Woodcock-Johnson Psychoeducational Test Battery (WJ-R) and the Test of Written Language (TOWL)

This demonstrates that for children with deaf mothers as well as for children with high compared to medium ASL fluency, no significant correlation between ASL competence and literacy could be detected.

To investigate whether children of deaf parents outperform children of hearing parents in ASL and/or literacy, the authors ran a second set of statistical calculations and found that in fact, both of these hypotheses proved to be true, even under division of specific age groups. The authors therefore concluded that “a clear, consistent, and statistically significant relationship between ASL skill and English literacy” (p. 43) exists even at a moderate ASL skill level. They discuss several possible explanations for this strong relationship and eventually suggest that ASL fluency does promote English literacy. For if the reverse were to be the fact – which could be argued –, the subgroup with hearing parents would be likely to beat the children of deaf parents in literacy, since the former can be expected to be exposed to more English language in their family communication than the latter. However, the opposite is the case.

Also, according to the side-tests conducted in the study, it is neither age, IQ, nor the factor of hereditary deafness which proved relevant to literacy acquisition. They examined the aspect of parental hearing status by comparing literacy levels of DH-children to DD-children within each ASL skill level (high, medium and low). It was found that only in the low ASL group, DD-children scored significantly better in English literacy than their DH-peers.

These findings suggest that even a moderate ASL fluency is highly beneficial to the acquisition of English literacy, regardless of parental hearing status, and only in children with poor sign language skills other factors related to having deaf parents – presumably positive affection, effective communication and parents’ acceptance of their child’s impairment – have significantly positive impact on a deaf student’s literacy skills.

And finally, the authors suggest that the frequently reported academic advantage of deaf children with deaf parents is due mostly to their easily achieved sign language fluency, “for, when ASL ability is held constant, DP children’s superiority in English literacy almost disappears. Thus, the longstanding question of why DP⁷⁰ children tend to outperform HP⁷¹ children academically may be resolved” (Strong & Prinz, 1997, 45).

Mayer and Akamatsu (2000) investigated in a three case study, whether or how deaf students less than fluent in spoken language utilize their sign language (ASL and SE⁷²) skills for comprehension and composition of written texts. The authors distinguish between receptive and expressive skills, since – as they emphasize – in *reading* a foreign language text, vocabulary or grammar problems can still be overcome to some point when meta-cognitive skills are at hand (compare Strassman, 1997), whereas having to *write* a text oneself confronts one with all ones insecurities and constraints.

The three subjects in the study were profoundly deaf students aged 12, 12, an 14, and attended a Northern American school with ASL and English (in sign and print) as official means of instruction. In separate sittings, two videotapes with fables of comparative length and complexity were presented to them, one in ASL, the other in SE. After each fable, the students were asked to put the story they had viewed in writing. Reruns of the tapes were permitted. Upon completion

⁷⁰ DP = deaf parents

⁷¹ HP = hearing parents

⁷² SE = Signed English or English-based sign.

of their texts, they were interviewed separately on how well they understood each video and how they went about generating their written text. All three students responded that they found the task not too hard, although the second story (in SE) was perceived as signed quite fast and “a little harder to understand” (p.397). One subject made significantly more errors of inflection morphemes in the ASL version and more errors of free morphemes in the SE version, which indicates that for this student, ASL had an advantage in transporting the content of a story, while SE was more helpful for the writing task, presumably because of structural similarities in signed and written English.

Apart from a quantity of mistakes in verb inflection and omissions of obligatory structure words⁷³ in all three of the subjects, each understood both versions well enough and had a strong enough command of English to convey the stories relatively accurate in script. Still, the students noted that they had to convert the sign phrases of the ASL version more consciously and with more effort.

Wudtke (1990) explains that even skilled deaf young readers frequently encounter problems in understanding the contents of a written story when more poetic or descriptive vocabulary is used, for example to create a more vivid image in a fairy tale (e.g. *sauntering*, *strolling*, *skipping* instead of *going* or *walking*). Therefore, he urges, educators and parents should help their charges to build up knowledge of word families and continuously extend their vocabulary and communicative registers.

Fast and well exercised word recognition is likewise vital: “Only words that are known at the level of automaticity – that is, can be read without thinking – facilitate comprehension. It is recommended that students know 90 to 95 percent of the words used in the reading materials to ensure successful development of reading. This is critical because the ability to name words quickly allows readers to allot most of their attention to meaning” (Paul 1992, 88).

Thus, Prillwitz (1986) explains, it is easily understandable, “why for example, texts for ten-year-olds can not be read independently by fourteen-year-old deaf students”⁷⁴ (p. 88).

Kammerer (1999) explains that one way to achieve the language competence necessary is through frequent reading to children and story telling in elementary education. “When [these activities] can progress approximately age-appropriately by means of sign, they strongly promote the development of reading and writing skills in the students”⁷⁵ (p. 102). And the MSD (1998) education policy statement reads: “parents and teachers sign stories from books to Deaf students by pointing to pictures and English words and identifying them in ASL. Then, students learn that ASL signs have English word equivalents. This in turn encourages students to spell and recognize words and eventually become readers” (p. 11). And Marschark (2001) concludes briefly: “children who read more become better readers, and better readers read more” (p. 37).

This can also be aided by writing activities, because it leads to a multi-channel representation (visual, auditory, motor) of a word. “Commitment to hours

⁷³ That are common in deaf persons’ writing (Krausmann, 1998/99)

⁷⁴ Original quote: “warum z.B. Texte für 10-jährige von 14-jährigen Gehörlosen nicht alleine gelesen werden können“ (translation by jh.).

⁷⁵ Original quote: “Wenn [diese Aktivitäten] mit Hilfe der Gebärdensprache einigermaßen altersgemäß ablaufen können, unterstützen sie unbedingt die Lese- und Schreibentwicklung der SchülerInnen“ (translation by jh.).

and hours of reading books and hours and hours of writing English are critical for achieving fluency in reading and writing English” (MSD, 1998, 11).

On literacy in DD-students, Poppendieker (1990) reports that in most cases these children demonstrate a richer acquisition of writing skills, their language development is age appropriate – merely in sign –, and compared to other deaf students they develop relatively early a global ability to distinguish between DGS⁷⁶ and written German. Poppendieker assumes that this ability can be strongly enhanced and accelerated by conscious contrastive grammar teaching. This assumption is endorsed through practical experience of teachers for the Deaf (Weinmeister, 2001; Kremp, 2002)

In general, it appears that “deaf children who learn sign language as a first language usually have better skills in reading and writing than deaf children who have only been exposed to spoken language ” (Magnuson, 2000).

6.2. Can literacy be acquired through signs only?

“Recent evidence suggests that a combination of both American Sign Language (ASL) and English-based signing may be a powerful combination in the academic success of children who are deaf. Research concerning the link between early exposure to ASL and English literacy scores, however, is still mixed. ASL provides access to early communication between parents and children, which in turn can promote the language and cognitive skills necessary for literacy and academic success in other areas. But ASL, not having a written form, cannot provide a bridge to written English on its own. English-based signing may be an effective way to introduce deaf children to English grammar and syntax, if it is accurate and complete. Total Communication Programs (utilizing simultaneous spoken and signed language) have not successfully improved literacy; consequently, there is a growing trend toward bilingual education for deaf children (alternating spoken/written English and ASL). Although ASL is typically promoted as the first language for children in these programs, the goal is to ultimately produce students who are proficient both in ASL as well as written and, perhaps, spoken English” (Marschark, 200, iv).

And Mayer and Akamatsu (1999) suggest “that it is not possible for any second language learner, including the deaf child, to completely ‘bypass’ the speaking-writing connection in the literacy learning process” (p. 5)

Paul (1992) as well, in pursuing this question, comes to the conclusion that “there is no compelling evidence that first- or second-language learners achieve high levels of literacy through exposure to and instruction in written form only of the target language Thus, in addition to a working knowledge of ASL, deaf students need to achieve a level of competence in a primary form (e.g., speaking, signing, finger spelling) of English that permits them, for example, to access printed words at a rapid automatic pace” (Paul, 1992, 89).

⁷⁶ DGS = Deutsche Gebärdensprache, i.e. German Sign Language.

6.3. Inner speech and language

This topic will be discussed at greater length in Chapter 7. However, its particular significance with respect of literacy shall be regarded at this point. The term *inner speech* can be used to denote two different phenomena: *phonological coding* (i.e. mental representations of speech) and *sub vocalisation* (silently or soundlessly ‘speaking along’ when reading). Both have been found to be particularly strong in good deaf readers⁷⁷ and a speech-based coding strategy seems to be important for reading and writing processes: Although “lexical access can proceed via a visual or a phonological route and ... phonological access of a word is not obligatory ..., speech coding aids higher-order comprehension processes in reading. After lexical access, there seems to be speech representation of the words formed in short-term, or working, memory and this assists in the processing of phrases, clauses, sentences, and larger units” (Paul 1992, 83f), so that “implicit phonological awareness seems to be a good predictor of early success in learning to read orthographically irregular languages (such as English) for both deaf and hearing children)” (Paul 1998, 178; compare also Diller, 1987, 187). Alternative, but apparently less effective, representation strategies found frequently in deaf readers are sign images, finger spelling, or lip movements (ibid; compare Mayer & Akamatsu, 2000). Nevertheless, several authors claim that although the perception of phoneme-grapheme correspondences is undoubtedly vital in reading, literacy can also be acquired to great fluency without this ability: „Certainly speech is not necessary in order to acquire language. Written language can be acquired, for instance, without knowledge of a sound-based system”(Wersich, 1992, 35; also Günther, 1990b).

Mayer and Akamatsu (1999) insist that the interrelation of spoken and written form of a language must not be underestimated. As evidence, they list the strategies applied by beginning writers to help them accomplish their writing task: writing down what they say (and speaking out what they think), sounding out letters and mouthing silently, saying words before and after writing them, and making comments about their process to themselves (inner language) and others (p. 4). In their study⁷⁸ (Mayer and Akamatsu, 2000), the students responded that, to aid them along, they were making use of exactly these strategies. And the less English competent a student was, the harder this appears to have been. The authors suggest that since SE seems to promote these properties of inner speech that are helpful to the composition process (and to structuring thoughts in general), and since thinking in ‘inner sign’ requires a conscious translation process into English, English-based sign should be given preference as L1 option for deaf children – especially in cases with hearing parents.

They later add, however, that they do not wish to preclude offering ASL to deaf children, either simultaneously or as a L2⁷⁹. Prillwitz and Wudtke (1988) share this view exactly, also because hearing parents are unlikely to acquire sign language to a native degree of fluency.

6.4. World knowledge

An abundant fund of vocabulary and concepts is the next part of the foundation to literacy. And here, signs seem to have a great potential.

⁷⁷ No need to mention that they are obviously even more present in hearing readers.

⁷⁸ Reported above

⁷⁹ L2 = second language.

Wudtke 1990 reports of deaf teenagers, who were exposed to spoken German and LBG⁸⁰ from early on, who started their expressive language with the “articulated sign⁸¹ accompanied by vocalisations on the way to words”⁸² (Wudtke 1990, 101), passed through a phase of mixing languages to finally – during adolescence – reach a level of linguistic maturity, in which they were able to distinguish and appropriately apply forms of signed and spoken/written language according to the conversational setting. This procession of developmental stages is comparable to those in bilingual hearing children, who also have to learn progressively to mentally and pragmatically separate the two languages they are exposed to.

„Within the horizon of SE (...) emerges with some time delay spoken language; depending on situation and communication partners, the children will then their mixed language games, to eventually, as teen-agers, detangle sign and spoken language that they develop simultaneously. Especially when reading and writing, the youngsters will operate merely with the system of spoken language, while making use of sign language when conversing over their spoken and written language“⁸³ (Wudtke 1990, 101f). In regard to literacy, Wudtke argues that meaningful reading can only be achieved when it is preceded by an internal creation of the meaning, since it constitutes not merely an extraction of thought from a written text but rather the active projection of concepts and associations, which were previously gained through communicative exchange, comprehension of a specific context, and first hand experience. For this in turn to be achieved, Wudtke considers the use of sign language among parents and deaf child to be a vital asset, since it allows unimpeded communication – if parents make the effort to learn sign language.

Mayer and Akamatsu (1999) reason that natural sign language is an excellent means to increase world knowledge, vocabulary, cognitive abilities and meta-linguistic discussions, but that a speech-based sign system should be adopted specifically (but not exclusively) to teach literacy. “While signing about a topic will undoubtedly assist the student in elaborating and expanding ideas, it does not, at the actual moment of composing, assist the student in making correct lexical, morphological, and syntactical choices” (p. 4), as speech-based coding strategies can.

Poppendieker (1990) agrees: “The kind of help that can be given through sign communication [is restricted] to the transport of contents“⁸⁴ (p. 125). It allows the children to exchange thoughts over what they have written, gives them a media to reflect, phrase their thoughts freely, and expand on their text accordingly.

⁸⁰ LBG = Lautsprachbegleitende Gebärden, comparable to Signed Exact English (SEE) or Signed English (SE).

⁸¹ Wudtke does not further explain what it is he calls an “articulated sign”.

⁸² Original quote: „artikulierte Gebärde begleitet von Lautierungen auf dem Weg zum Wort“ (translation by jh.).

⁸³ Original quote: “Im Horizont der LBG (...) emergiert zeitverzögert die Lautsprache; je nach der Situation und den Kommunikationspartnern wechseln dann die Kinder ihre gemischten Sprachspiele, um als Jugendliche schließlich klar die Lautsprache und die Gebärdensprache, die sie untereinander ausformen, zu entmischen. Speziell beim Lesen und Schreiben operieren die Jugendlichen nur noch im System der Verbalsprache, um beim Reden über die Verbalsprache wiederum auf Gebärden zurückzugreifen“ (translation by jh.).

⁸⁴ Original quote: “Die Art der Hilfe, die durch die Gebärdenkommunikation geboten werden kann, [beschränkt sich] auf die Vermittlung von Inhalten“ (translation by jh.).

6.5. Metacognitive skills

Barbara Strassman (1997) – a lecturer on Education for the Deaf at the College of New Jersey, Trenton – found that metacognition (i.e. specific strategies for solving comprehension problems when reading a difficult text) is particularly poor in deaf students due to very directional teaching habits of many teachers. When teaching such metacognitive skills to the children in her experimental group, they significantly improved their literacy competence as well as class discussions and even student attendance.

These findings are supported by parents in unstandardized reports on the longitudinal gains of their deaf children after having transferred to a bilingual class (Milošević and Schwerdtter, 1998). They claim that in their children's cases, the preceding years of oral training have resulted merely in incomprehensible speech, an aversion against their "tedious training" of language (ibid, 416), great deficits in age-appropriate knowledge and social behaviour, and low self-esteem. The bilingual class instruction, on the other hand, helped them to catch up on language and academics as much as possible and even allowed them to study and communicate well enough to take on a job of their choice, which – in the authors' view – would have been quite unthinkable without the merits of sign.

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Many important conclusions can be drawn from this chapter. First, my personal experience confirms the accusation of schools for the Deaf to by and large fail to establish a reading level among their students that is equal to that of hearing peers – as is possible and in some countries the general standard of deaf education (e.g., in Sweden).

Secondly, neither sign language nor oral language seems to be capable on its own to reach this standard. Sign language can be adopted for the acquisition of world knowledge, for meta discussions on reading material, to ensure comprehension, for brain storming, and so forth. Spoken language, on the other hand (and this includes writing, lip reading, spelling, finger spelling, and all other speech- and script-based activities) have undisputable qualities in facilitating inner speech and a phonological awareness valuable for the development of literacy. Also, the most possible use should be made of the grammatical parallels in spoken and written language.

This indicates that a well structured bilingual approach may offer excellent conditions for deaf children to develop literacy skills.

7. Inner Language, Inner Speech and Sign, and Egocentric Language

These four phenomena are closely interrelated and yet quite distinct from each other. For better understanding, I will try to focus on each of them separately – as far as possible.

7.1. Inner language

This term usually denotes an internalized version of expressive language features, such as hearing ones own voice when thinking. However, the two are not merely equivalents to each other, but also show decisive differences: Inner language, when uttered in form of monologues (or *egocentric* language), is found to be more elliptic, disobeys grammatical and/or phonological rules, and is often muttered and slurred and thus incomprehensible to others. The contemporary explanation for this use of language is that it is not intended to serve social functions (i.e. communication), but to help in guiding through mental processes of problem solving, focusing of thoughts and attention, and the like (Wygotski, 1974; Zander, 1978; Prillwitz, 1982).

The view that inner language is “the driving force for symbolic thought”⁸⁵ (Prillwitz & Wudtke, 1988, 102), that leads to „consolidation, control and optimalization of cognitive processes”⁸⁶ (ibid.), is supported by findings that it becomes increasingly elliptic and occurs augmented – even in adults – in situations of mental challenges or when distracting factors, such as noise, are present (Wygotski, 1974; Prillwitz & Wudtke, 1988).

In regard to deafness, it must be asked whether inner language is present as well, if it serves the same functions and what form might it take on: internalized speech, sign, some combined form or neither of these?

According to List (2002), inner language enables increasing self-referentialisation and is beneficial to expressive language skills and higher quality discourse with social partners, because with the emergence of inner language, children start to engage in dialogues with themselves, discover that their thoughts and views might differ from those of others and can thus commence to form hypotheses or a *theory of mind* and develop social sensitivity, which is a stepping stone on the way to becoming a mature social interaction partner and developing a rich emotional repertoire. Regarding deafness, List argues that since inner language is such a vital asset, it would be irresponsible to risk a child not developing it due to adults pressing on oral skills too eagerly (List, 2002). Sign language cannot be harmful to this process but can on the other hand prove a lifesaver for countless deaf children not acquiring spoken language fast and extensive enough to engage in inner dialogues during those crucial first years of linguistic, cognitive and emotional development (ibid.).

⁸⁵ Original quote: “die treibende Kraft für symbolisches Denken” (translation by jh.).

⁸⁶ Original quote: “Fundierung, Steuerung und Optimierung kognitiver Prozesse” (translation by jh.).

Meadow (1980) reviewed a large body of literature concerned with the influence of deafness on child development and comes to the conclusion that “children who are exposed to early manual or simultaneous manual-oral input appear to develop more adequate inner language, with no reduction in their abilities to use speech and speechreading for communication, than children who are not so exposed” (p. 43).

7.2. Inner speech

As has been indicated above, inner speech is the spoken version of inner language. It consists of a silent or semi-silent form of speaking or mumbling and is also referred to as ‘phonological coding’, which – as has been discussed in the previous chapter – is particularly important in reading and writing (Paul, 1992; Mayer & Akamatsu, 2000). In the study of Mayer and Akamatsu (2000), one of the girls, when asked how she knew what to write in English, answered she was „*talking in her mind* and that she was thinking about the *speech*“ (p. 398).

7.3. Inner Sign

Deaf people when asked how they perceive their own thoughts reply that they *feel themselves signing* even when not notably moving their hands (compare also Diller, 1987, 102). This is exactly what can be expected as the “deaf equivalent” to inner speech in hearing people. However, the term ‘inner sign’ is one rarely used⁸⁷, even though conclusive.

For reasons of personal interest, I addressed this question to deaf adults from different nationalities (US American, Swedish, German) and always received this same answer. They also confirmed the elliptic and accelerated nature of this intrapersonal code and their use of it in complex mental processes, as opposed to signing for communicative purposes.

It therefore seems that egocentric signing serves the same function as egocentric speech, with the only difference being that it might be easier for deaf children to engage into, *if* they have a higher sign than spoken language competence.

7.4. Egocentric Language

The nature and function of egocentric language has caused quite some controversy in the past century. The issue first arises in publications of Jean Piaget, the Swiss psychologist who advanced a theory on developmental stages of cognitive development in (hearing) children (Piaget, 1988). Without going further into this subject, his view on language was that it is just one among many possible symbol systems to facilitate thought, and is dependent on the emergence of cognition. According to his theory, children progress from an *autistic* to *egocentric* and finally *social* state of language command in the course of full language acquisition. Vygotsky (1962) disagrees with him in some points and argues contrarily that children are from birth essentially social and that their development and use of language logically starts with a social phase. Egocentric language, in his view, is evidence for the beginning of internal thought that is independent of social (external) language. He thus explains that those monologues

⁸⁷ And has therefore been omitted from the title of this chapter

become increasingly elliptic and less well articulated, and that they can also be found in adults when concentrating or the like (see above).

Prillwitz and Wudtke (1988) observed egocentric signing in seven of their ten children in their early bilingual intervention programme around the same age and with decreasing frequency and grammatical completeness – just as has been found in hearing-speaking children (Piaget, 1972; and others). The remaining three subjects formed the group of multiply handicapped children and although they as well exhibited egocentric signing, they engaged into it approximately three years delayed.

In all children it was frequently accompanied by vocalizations and articulation. The authors take this as an indication of how natural and effortless deaf children in a bilingual setting can acquire (external, social) language, that is conceptually and morphologically strong enough to consolidate inner language even before school age, and thus guarantee a foundation necessary to facilitate higher cognitive processes (compare also Chapter 5 on Cognitive Development). This, Prillwitz and Wudtke insist, had been absolutely illusory in an oral educational setting – as their pre-intervention study of 1977 had made evident.

Similarly, Kelman (2001), a Brazilian researcher, has investigated eight congenitally deaf children aged 2,0 to 5,0 on the question of whether inner language can be observed in deaf children. The children in her study had no previous formal instruction in either Portuguese or sign language, and were videotaped during 2 prepared play sessions of approximately eight to 15 minutes at the beginning of their school period. The videotapes were subsequently analysed for *egocentric events*, i.e. “time [intervals] during which the child is externalizing his or her reasoning process (...), that is, when sounds and gestures are being used to support planning, organizing, or deciding” (Kelman, 2001, 278). She classifies the observed responses into six categories: (a) motor reaction activity, (b) oral-facial-mimics, (c) body expressions, (d) silent lips articulation, (e) murmur, and (f) vocalization. However, a rationale behind this choice of classification as well as exact definitions and terms of differentiation between for example *oral-facial-mimics* and *silent lips articulation* is missing and provokes certain doubts in the figures and interpretations offered with her results.

However, upon summing up the total of incidents in each category, Kelman finds that (d), (e), and (f), which – according to her – are more closely related to spoken language, were each produced in only one form of manifestation. Body expression on the other hand was observed most frequently. Kelman argues that “body expression (...) is the obvious surrogate of actual speech. That is, the body is instrumental not only for locomotion and to express emotions, but to support the thinking process” (ibid, 278). She concludes from this that deaf children who have not (yet) mastered spoken language will resort to other forms of linguistic⁸⁸ manifestation ((a)-(f)) to structure and aid their reasoning process; and finally that “deaf children should not be discouraged from “gesticulating” when playing. This behaviour expresses mental activity, which is an important element in cognitive development”(ibid, 279).

Although this is not the most convincing piece of scientific evidence, it also demonstrates that deaf children engage into egocentric language and manual / sign communication aid them in this process.

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⁸⁸ According to her own definition of language (see Kelman, 2001, 277).

It seems that the importance of inner language for cognitive development is widely agreed upon. There even seem to be positive influences on a child's communicative abilities (or 'social language') as well (see List, 2002, above). Both are areas of great difficulty to deaf children, and any help in promoting them might avoid bitter arrears in cognitive, academic and social respect.

So if inner language is not just related to social linguistic interchange but also decisively attributes to a child's cognitive development, it is vital to be promoted along the regular language acquisition process.

At the same time, phonological coding in form of inner speech is obviously of great value to literacy and should be promoted as much as possible within any educational context. Naturally spoken language input is vital for this task and can be expected (which is implicitly demonstrated by Prillwitz and Wudtke, 1988) to profit from a solid inner language foundation – regardless of modality. So one could enhance social and inner language through sign communication (sign language or speech-based sign) while putting some special effort into increasing conscience of spoken words and grammar and thus promote inner sign and speech, and in consequence provide a valuable support for literacy.

A bilingual approach would offer a deaf child all available such means, and since negative effects or interferences are not reported, this appears to be the best general recommendation – individual needs respected.

8. Lip reading

The true value of *lip-* or *speech reading* is said to be restrictive, because only a relatively small portion of articulatory parameters⁸⁹ can be perceived visually, and in addition, it is subject to many disturbance factors, such as lighting conditions, face orientation, or obscurity by hand movements or beards, moustaches and so forth (Scheetz, 1993). Nevertheless, it can prove a great communication aid to hearing-impaired persons when interacting with speaking non-signers (Mende-Bauer, 2001; Lentzen, 2002; Rüger, 2002). And since speech reading is inherently related to spoken language, but has also been argued to be an essential part of sign language, the following questions seem to arise:

8.1. Do aural and oral skills influence lip reading abilities, or vice versa?

One would expect that deaf children relying on visual cues in an aural-oral conversation would develop a much more refined ability to decode lip movements than fully-hearing persons. But quite contrary, Conrad, who investigated the relationship between lip reading and language competence in general, found that “the lip reading abilities of hearing children, who had no previous training or experience with this skill, received scores in specially designed tests that were equal to or higher than those of deaf children” (as cited in Meadow, 1980, 30).

But as indicated, one factor decisively attributing to this will be the general language competence significantly greater in hearing than in those deaf children who are depending exclusively on speech reading for communication. It would therefore be necessary to critically examine the original source to be able to judge whether there is in fact a positive correlation between aural/oral skills and lip reading ability or rather between general language competence (including metacognitive skills and world knowledge) and lip reading.

8.2. Does sign language competence influence lip reading abilities, or vice versa?

Diller (1987) argues that sign and speech are too different in nature for signs to be able to support speech reading: “no sign supports any articulatory element directly. Lip reading a spoken language cannot be augmented through sign implementation due to decisive differences in the production parameters of the two systems”⁹⁰(p. 184).

In contrast, Prillwitz and Wudtke (1988) claim that „sign supported communication enhances the development of active mouth movements and therefore the lip reading qualities greatly. It promotes this ability decisively,

⁸⁹ I.e., lip movement, tongue position, voice, etc.

⁹⁰ Original quote: “Kein Gebärdenszeichen unterstützt in direkter Weise ein lautsprachliches Artikulationselement. Das Absehen der Lautsprache kann aufgrund der Wesensunterschiede beider Artikulationssysteme durch die Gebärde nicht unterstützt werden“ (translation by jh.).

because the children grow to effectively anticipate and draw conclusions in lip reading“⁹¹(p. 90). They even insist that this is the case not only for artificial sign systems but also for German sign language and conclude at a later point, in respect to the well known advantages of deaf children from deaf families: “The great advantage [of these children] lies (...) in their speech reading and literacy skills. The reason for this can most likely be found in their elaborate sign language competence, which includes as important part the active mouth movements produced simultaneously with the signs“⁹² (ibid., 118).

Again, it is a solid general language competence – here: in sign – that is drawn special attention to, and its inherent connection to the speech-based lip movements. As mentioned above, Prillwitz and Wudtke also emphasize metacognitive skills (“*anticipate* and *draw conclusions*”, see above), so it can be assumed that it is rather these fundamental qualities than any modality-bound factors, that facilitate a higher ratio of successful ‘educated guesses’ when trying to decode lip movements in a spoken conversation.

8.3. Does lip reading competence influence literacy skills, or vice versa?

As discussed in previous chapters, both areas – the ability to communicate effectively with speaking non-signers and literacy – are usually of great value to deaf individuals, so in my view, this is a topic of great potential.

The only statement heard occasionally from teachers is that deaf learners tend to make frequent spelling mistakes when relying too much on lip movement correspondences for orthographical choices (see also Hildmann, J., 2002). But unfortunately, little systematic literature covers this topic. So, as it seems, this will remain one of the unharvested fields of cognition until further research is done.

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Naturally, a series of other questions in connection to lip reading comes to mind, for example, on the possibility of using speech reading techniques to practice vocabulary, on particular gains of simultaneous communication (SC) – because of an active multi-channel processing – on memory, learning, or the like, and many more. I could also imagine useful implications for parents and schools.

But we are digressing from the issue of bilingual exposure, so I would like to proceed to the next aspect and leave this topic to be investigated further.

⁹¹ Original quote: „Die gebärdensbegleitete Kommunikation fördert die Ausbildung aktiver Mundbilder und damit das Absehen in sprachlichen Situationen erheblich. Sie verstärkt geradezu diese Leistung, weil die Kinder sinnerwartend, kombinierend ablesen können“ (translated by jh.).

⁹² Original quote: “Der deutliche Vorsprung [dieser Kinder] liegt ... im Ablesen und im Schriftspracherwerb. ... Der Grund dürfte in ihrer differenzierten Gebärdensprachkompetenz zu sehen sein, die das aktive, parallel zur Gebärde produzierte orale Mundbild in erheblichem Umfang mit einschließt“ (translation by jh.).

9. Sign Language

Several studies have demonstrated that deaf and hearing children exposed to sign language from birth or at least from a very early time on, exhibit a language acquisition that is in speed and succession of specific stages very similar to that of hearing children acquiring spoken language (Prillwitz & Wudtke, 1988; Boyes Braem, 1995; Petitto, 2000; Petitto et al., 2001a; Marschark, 2001). In many cases observed, they reach linguistic milestones (such as first word/sign, first two word phrase, first 50 words, etc.) at exactly the same age as speaking controls, and this even so when growing up bilingually (one spoken, one sign language or two sign languages) (Petitto et al., 2001a; Petitto, 2000)! – Even the existence of various babbling phases, hitherto believed to be a phenomenon exclusive to aural-oral languages, has been proven to exist likewise in signing infants (Petitto & Marentette, 1991; Boyes Braem, 1995; Petitto, 2000; Petitto et al., 2001b).

These findings support the view that “there are no reliable data indicating any particular difficulty with regard to learning sign language” (Marschark, 2001, 24). However, it has often been argued that speech-based sign systems, if offered as the only form of communication constitute a compromise to both language and a mutual loss (e.g., Mayer & Akamatsu, 1999). Boyes Braem (1995), on the contrary, argues that children exposed to sign language as L1 seem to be able to acquire it to a degree of native proficiency, even when the language models available to them are far less than fluent – such as most hearing parents and teachers using artificial sign systems are. She assumes that this is the case because specific language learning mechanisms⁹³ allow *young* learners to fill in those input gaps and unfold a complete language system.

The observation that deaf children exposed to signs at an early age rapidly surpass their hearing parents in sign fluency has equally been made by other authors (Prillwitz & Wudtke, 1988; Angerby, 2001) and somewhat weakens the claim of specialists viewing signs in early deaf education rather sceptically, that hearing parents are likely to be incapable of picking up signs fast enough to provide a mature language model and a solid communication basis for ‘natural’, emotion laden interactions with their deaf child (e.g., Horsch, 2001b).

Prillwitz and Wudtke (1988) even report that the parents observed by them were motivated by their children’s rapidly growing sign competence to learn more signs and even sign language⁹⁴ themselves. Their best ‘instructor’ in this endeavour proved to be their own offspring, but contact to other signing children and deaf families was actively sought (p. 74).

Although many proponents of aural-oral or similar approaches rightfully insist that sign language, unlike aural skills, can still be acquired by deaf people at any later point in life (e.g., Diller, 2002; Clark, 2002; Schmid-Giovannini, 2001a), empirical observations by teachers and other professionals working with deaf individuals made evident, that such *late-signers* almost never acquire sign

⁹³ E.g., overgeneralization of morphematic rules, such as generation of plurals by suffixing –s even in irregular nouns: mouse → mouses, woman → womans

⁹⁴ The formal sign courses they received within the early intervention programme they took part in only taught them LBG.

language to a ‘native’ proficiency level (compare Broesterhuizen, 2000; and arguments by Boyes Braem, 1995 as stated above). In contrast to *early-signers* (deaf or hearing), who acquire sign language as L1, even when simultaneous to a second L1 (spoken or signed; compare Petitto et al., 2001a; Pruss Romagosa, in press).

10. Academics

A view into class rooms in many schools for the Deaf makes clear, that there is often a significant academic delay in deaf compared to hearing children⁹⁵. However, as discussed in Chapter 5, both groups have by nature the same chances for cognitive growth and learning, so the fault cannot be sought in internal factors. And since much theoretical and practical knowledge is acquired through some form of linguistic intake (reading, lectures, discourse), language competence is a decisive factor in academics. “In the United States it is well documented that academic achievement is closely connected to English language skills. Deaf students acquire English at a slower pace than hearing students, although along a similar path. ... This slower learning pace results in low achievement levels and restricted annual gains, leading to deaf students averaging six to seven years behind their hearing counterparts by the time they leave high school” (Strong & Prinz 1997, 37).

Unfortunately – or fortunately, if you will –, it is impossible to design a standardized test to determine the particular effect of a communication mode on academic success, because too many variable parameters would have to be taken into account, that might and will have significant impact on which abilities and skills a child acquires. “Academic success, in whichever area in particular, is always the result of a combination of factors, and deaf children are just as diverse as hearing children in the ways these factorial complexes become effective”⁹⁶ (List, 2002).

So the majority of publications presented in this chapter are informal reports of teachers and parents, who have observed oral-aural compared to bilingual deaf children, sometimes over a period of many years. Nevertheless, their expositions must not be regarded as inferior to any formalized test procedure.

Kammerer (1999) – a teacher at the *Westfälische Schule für Gehörlose in Münster*, Germany – describes how the conversations in her class became increasingly more fluent and “lively” when she started to support her up to that point oral-only instruction method with signs (p.96). She reports that she, as well as others colleagues attempting the TC approach, suddenly found students to bring forth their own ideas, questions, and initiations to problem solving strategies. This improvement reached such an extent that on this new basis of increased interaction and even cooperation between teachers and students, the teachers started to alter their instruction behaviours towards more student-oriented methods promoting student activity and communication, thus fostering individual learning strategies and responsible behaviour. Kammerer then describes a series of specific classroom activities (discussions on literature, philosophizing over an afterlife, and the like). All of this – according to her own account – would not have been possible without signs: „In my many years of teaching, I have worked

⁹⁵ With mostly the exception of DD-children!

⁹⁶ Original quote: “Lernerfolge, in welchen Bereichen immer, sind stets einer Kombination von Faktoren zu verdanken, und gehörlose Kinder zeichnen sich genauso wie hörende durch individuelle Unterschiede bei der Wirkung derartiger Faktorenkomplexionen aus“ (translation by jh).

10. Academics

with different classes at several schools for the Deaf, among which were some groups with good speaking abilities. In all groups, talks like these would have been unthinkable without signs”⁹⁷(p. 99). She insists that many nuances of stories read to the children and many emotional conversations would invariably be missed, as her many years of teaching orally have proven to her. The children were able to express assumptions on the continuation of a story, identify with the characters but also to critically reflect them and make their own point of view clear on the matter. Overall, subject-related communication increased among students and soon began „wie nebenbei ... zwischen ihnen ein intensives peer-teaching“ (p. 100).

These findings have been endorsed by many teachers, who have conducted or experienced oral education in schools for the Deaf, and who then switched to bilingualism or a TC-approach (Fertig, 2001; Bernatzky, 2001; Kremp, 2002) and various researchers (for example, Strong & Prinz 1997; Marschark, 2001).

Similarly, in the case of Pinter’s (1999) bilingual class in Kärnten, Austria, the learning process and positive general development of the children passing through a 5-year experimental phase of bilingual education (1990-1995) was so remarkable, that other parents explicitly demanded for bilingualism to be practised in the classes of their own children to enable them to achieve equally impressive levels of literacy, academic standards and personality development.

Four of the students (the class originally composed four children, but by the end of the project no less than ten!) from her experimental class were subsequently transferred to a hearing school where instructions were continued to be administered in spoken and sign language simultaneously by a hearing and deaf teacher team. The students maintained a good academic standard and enjoyed socially high reputation in the eyes of their hearing peers and teachers (p. 63). In an attempt to reproduce the delightful success of this mainstreamed group, the (hearing) school gave consent to a second set of deaf students to transfer over and form another bilingual class with regular hearing children. Unfortunately, this second group of hearing-impaired students had previously been mainstreamed without receiving special education attention. And the teachers discovered that while the first group – bilingually instructed at the deaf school – had a good degree of sign language and therefore communication and general language competence, and had been able to draw even in academic demands with their hearing peers, the second group of children, mainstreamed from the beginning, had basically no sign competence and mostly insufficient literacy skills, which made an integration with equal demands nearly impossible. The teachers then strongly recommended sign language courses to their class and put a special focus on their sign language acquisition in lessons. Summing up, Pinter describes the essential advantage of bilingualism as follows:

“It becomes evident, that not only children with an adequate L1-acquisition during their pre-school years can grow to reach excellent academic achievements. Likewise, children with no language development what-so-ever and horrific deficits in every way at the time they enter school, demonstrated impressive advances in their linguistic-conceptual, cognitive and social-emotional development after merely a short period of instruction (approximately one to two

⁹⁷ Original quote: “In meiner langen Berufstätigkeit habe ich verschiedene Klassen an verschiedenen Gehörlosenschulen unterrichtet, darunter auch Kindergruppen mit guten Lautsprachfähigkeiten. In allen Gruppen wären ähnliche Gespräche ohne Gebärden undenkbar gewesen“ (translation by jh).

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years). Everybody involved in the educational process was able to observe this”⁹⁸(Pinter, 1999, 65).

Scheetz (1993) – citing an investigation by Meadow and Schlesinger (1972) – reports that on SATs (*Standardized Achievement Tests*), students participating in early intervention programmes utilizing a manual method scored significantly higher (by approximately 1.44 years) than deaf children who received instructions oral only. “Their research also indicated that children in the manual group received superior scores in the areas of reading, vocabulary and written language.” (Scheetz, 1993, 84). And Prillwitz (1982) comments on the oral-aural approach: “The relatively high ineffectiveness of oral learning processes in Deaf schools becomes particularly overt on the content level, when even in science classes, in which the content should be granted a higher priority than the form of communication, the entire learning process has to pass through the eye of the needle of the speech-read and articulated word, while an integration of sign language would allow a much higher and more differentiated transmission of information”⁹⁹(p. 123). And in a similar notion it has been argued that an internal language base – which can be provided most easily through sign language – “facilitates [the] acquisition, storage, and application of academic knowledge” (Strong & Prinz 1997, 38).

Regarding the effect of parental language use on language acquisition and academic achievement, Strong (1988) states: “Brasel and Quigley (1977) attempted to address this issue by assessing the effects of four different home language environments on academic performance through a comparison of scores on the Stanford Achievement Test and the Test of Synthetic Abilities. The four groups consisted of children aged 10-19 who had received oral English with intensive training, oral English with no special training, manual English (PSE), and ASL. The authors found that the manual English group scored highest in all measures of achievement, reading and grammatical ability. The oral group with no special training scored lowest on all measures, and the ASL group scored higher than the intensive oral group. Thus, Brasel and Quigley concluded that manual communication has an advantage over all oral communication and that manual English is preferable to ASL” for academic instruction (Strong 1988, 116).

Also, auralism is argued to frequently lead to strongly directive and restrictive interaction patterns in parents and teachers (Scheetz, 1993; Wood, 1991), which in turn has been proven to have a negative effect on the problem solving ability, creativity, communicative expression, and other higher cognitive abilities (Martin, Craft & Sheng, 2001; Wood, 1991). “Such negatively deviant

⁹⁸ Original quote: “Es hat sich gezeigt, dass nicht nur bei Kindern mit einem in der vorschulischen Entwicklung guten bzw. altersgemäßen Erstspracherwerb hervorragende Lernfortschritte erzielt werden können. Auch Kinder, die zum Schuleintritt keinerlei Sprachentwicklung aufwiesen und erschreckende Defizite in jeder Hinsicht hatten, konnten bereits nach kurzer Unterrichtszeit (etwa ein bis zwei Jahre) höchst bemerkenswerte Fortschritte in der sprachlich-begrifflichen, kognitiven und sozial-emotionalen Entwicklung erzielen. Dies haben alle am Erziehungsprozess Beteiligten beobachten können“ (translation by jh).

⁹⁹ Original quote: „Die relative Ineffektivität der oralen Lernprozesse in Gehörlosenschulen zeigt sich besonders auf der Inhaltsebene, wenn selbst im Sachunterricht, wo es eigentlich um die Inhalte und nicht primär um die Form der Kommunikation gehen sollte, der gesamte Wissenserwerb durch das Nadelöhr des abzulesenden und zu artikulierenden Wortes gehen muss, obwohl mit Einbeziehung der Gebärdensprache bedeutend mehr und differenzierte Information zu vermitteln wäre“ (translation by jh).

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socialisation processes¹⁰⁰ are highly correlated to the qualitatively and quantitatively restricted means of communication among parents and their hearing-impaired child¹⁰¹ (Krüger, 1987, 54).

Upon change of interaction style, instructional behaviour or even explicitly teaching metacognitive skills to deaf students – as is exercised in many hearing classes – the attained level of reading comprehension (Strassman, 1997), mathematical concepts (Gregory, 1998), applied problem solving strategies, structure of working process and socially appropriate behaviour rose significantly (Martin, Craft & Sheng, 2001; Heiling, 1995).

Regarding mathematics, Gregory (1998) states that in comparisons of hearing and deaf children, the deaf group scored several years behind their hearing peers, albeit not as far as in literacy levels. Upon discussing several possible causes and corresponding scientific evidence for each, she concludes that “the quality of instruction received by the child is the main factor in [mathematical] achievement. Effects (...) identified here were supportive teachers, regular and extensive reviews of the material, devoting time to direct instruction, positive encouragement and high demands on students” (p.121). In respect to language competence, Gregory explains some of the problems deaf students are faced with: Technical terms such as ‘hypotenuse’ or ‘denominator’ are completely foreign to them, while even logical conjunctions, comparisons, prepositions, and nominalisations cause confusion and comprehension problems (compare also Bimüller, 2002). “An even more difficult issue may be that there are everyday words in general use (...) which, when used in mathematics, have very particular meanings” (Gregory, 1998, 122), such as ‘a *high* number’. Also, the amount of abstract symbols used in arithmetic seems to present considerable difficulty. And finally, deaf children are lacking all the incidental exposure to numbers and ‘mathematical conversations’, counting games, nursery rhymes, and the like. “The speed of cars, the size of clothes, the time of television programmes, the size of pay claims, family finances, are a few of the many ideas that are likely to be background information for most hearing children growing up” (p. 124). And this seems to apply to deaf children in general, regardless of their prime communication mode: “Counting has been shown to develop more slowly in deaf children than in hearing children regardless of whether they speak or sign” (ibid.). Wersich (1992) has argued that children might draw an advantage from counting in signs, while Gregory (1998) seems to see here a source for complication. However, this contradiction might be due to different ways of representing numbers in German versus American Sign Language, respectively.

One great pragmatic problem with mathematical signs is that there are basically no standardized ‘mathematical signs’. Every teacher – or at best an entire school – has to agree upon or invent a sign for each mathematical symbol and operation (Angerby, 2001; Randler, 2001, Fertig, 2001). And even then problems do not cease, since – using as example the operation *addition* – “a number of different signs were required, depending on the process of addition being discussed, adding one amount to another, bringing two things together, or

¹⁰⁰ physical sanctions as only disciplinary means, material gratifications, excessive demands, pampering, providing constantly unnecessary aid, strong external control, fewer chances to experience autonomy, and so forth

¹⁰¹ Original quote: “Derart negativ abweichende Sozialisationseffekte hängen eng zusammen mit den quantitativ und qualitativ eingeschränkten Kommunikationsmöglichkeiten zwischen den Eltern und ihrem hörgeschädigten Kind“ (translation by jh).

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using the conventional symbol for addition” (Gregory, 1998, 126). This, of course, is a problem not restricted to mathematics but to every subject making use of technical terms and therefore especially in vocational schools and higher education, and which is an undeniable drawback to sign language. But since in other areas reviewed so far, simultaneous communication did not seem to have any truly negative impacts, one will simply have to consider in every class or single case whether teaching with spoken and written language only will suffice the purpose or whether signs should be included as far as possible and applicable. Maybe the growing maturity of sign language will provide answers for this in the future.

In respect to the attainable degree of mainstreaming, it has been found that “deaf students who attend English classes with hearing peers are likely to have considerably greater linguistic competence than those not integrated, whereas those integrated for mathematics may not differ from those in special classes to as great a degree” (Gurp, 2001, 66). However, some of the preconditions for the decision of whether a child should be mainstreamed are his or her mathematical and general academic achievements. Therefore, conclusions about causal relationships one way or the other need to be scrutinized sceptically.

*

Apart from the general problem of an insufficient body of widely known signs for technical terms, the findings on the effect of sign language exposure on general academic success seem to be unanimous: bilingual instruction has every conceivable advantage over an oral-aural teaching style.

But although I could not find reports of negative effects of bilingual exposure, presumably, those teachers making unfavourable experiences will simply abandon signs and not widely publish any papers on this issue. Therefore it is well possible that this chapter presents a rather unilateral discussion point. However, this was simply the literature accessible to me. If any of the readers have different views on or experience with the bilingual approach in an academic setting, I will be delighted to hear from them.

11. Relationship and Communication with Parents

The diagnosis of having a deaf child is generally a great shock to parents (Hintermair & Horsch, 1998; Funk, 2001), followed by a usually long coping process with a succession (and potentially regression or reoccurrence) of certain phases (e.g., Scheetz, 1993). One of the most critical effects of a child's deafness – and disability in general – is that on the emotional relationship between parents and child (Funk, 2001). Certainly, the bonding of parents and their children is not exclusively dependent on what in an adult relationship might be dispassionately called 'exchange of linguistic signals or messages'. Rather, many features such as body contact, eye contact, mutual object of attention and play, and so forth (Gallaway, 1998; Horsch, 1997, 2001a, 2001b) play an essential part in the bonding process. But all of these are by now realized to be preverbal communication acts, actively accelerating the language acquisition process of hearing and deaf infants alike (Bruner, 1987; Diller & Horsch, 1997; Horsch, 1997, 2001a).

Still, many issues that might cause a relationship to be perceived as good or bad generate in linguistic interchange, and a poor basis of mutual communication chances as well as a disability like deafness – severely hindering the establishment of a common signal system for interaction – will naturally have grave immediate effects on the parent-child-relationship (Funk, 2001; and others).

This – when regarding the family as a micro system and a first step in the socialization process towards becoming a fully accepted member of the mainstream society – has been the rationale behind centuries of global oralism, as will be well known to the reader. The attempt to establish a positive relationship between hearing and deaf individuals via teaching – not rarely: forcing – the deaf communication *partners*(!) to speak, has failed in many cases feebly. Even oralists (with whom I agree perfectly on the value of spoken language to deaf children!) can not close their eyes to the countless orally raised deaf adults who overtly regret their near-to-non-existing emotional relationship to their hearing parents.

The question then is, is this the invariable fate of deafness or can a relationship comparable to those in HH-families¹⁰² be nurtured by creating a bimodal bilingual communication basis? In other words, do we find evidence of better parent-child relationships in bilingual or TC families than in HD-dyads conversing purely orally or purely in sign?

First, the visual nature of sign language has been argued to confront parents in an overt way with their child's disability (Funk, 2001, 285). That a signed conversation in a public setting invariably attracts attention from hearing strangers is common knowledge among the Deaf and those associating with them (Lentzen, 2002; Randler, 2002; Rüger, 2002), and might increase this negative attribution. One could reason that a perpetual series of such potentially embarrassing situations would have to have a negative impact on the emotional relationship between parent and child – which in turn would be an argument against the use of

¹⁰² Which is by no means always a positive one, as I well know! But at least a communication barrier – which is the topic here – is not the ground for this deplorable state of affairs.

sign language, since in professional discussions in the field of education, the strong relevance of parent-child-bonding for nearly every conceivable aspect of child development is common intelligence by now.

This might in fact be true for some parents, but in that case they are likely to find a purely oral approach more suitable to the particular needs and characteristics of their family. However, parents who have actively opted (and sometimes fought) for a form of sign system as communication mode with their child, tend to be already in a positive stage of coping with their child's disability, make the deliberate effort to learn signing themselves¹⁰³ and accept this different modality of language not as a sign of defect but as a valuable chance and positive competence in their children that goes hand in hand with accepting the child as a valuable person not with a deficiency but with a legitimate difference (Prillwitz & Wudtke, 1988).

But even then, problems similar to the one Funk addresses, might emerge: A questionnaire on *Family Adjustment to a Deaf Child in a Bilingual/Bicultural Framework*, answered by 42 parents (21 couples: 6 British, 15 Dutch), 6 (hearing) teachers and 6 (deaf) counsellors¹⁰⁴, revealed that a tension sometimes arouse between the wish of parents to support a "Deaf identity" and ample contact to the Deaf culture and on the other hand exactly such aspirations even more overtly confronting them with the difference between themselves and their child.

I fear, this might be a detrimental drawback of taking the philosophy of preparing the deaf child for an integration into both worlds (i.e. the hearing and Deaf culture and society) serious. But fortunately, this negative effect does not apply to the majority of parents, for many find their contact and growing insight into the Deaf culture and society¹⁰⁵ quite agreeable and gratifying, especially in regard to the relationship to their own deaf child (Angerby, 2001; Donath & Donath, 2002). Prillwitz (1982) as well suggests that a positive attitude of deaf individuals and their immediate social surrounding towards sign language and the Deaf culture will take much of the tension out of the social and emotional issues within a family with a deaf child (p. 127).

Parents choosing to communicate bilingually with their deaf child are not, by all means, expected to be fluent in sign language by day one and to be perfect (sign) language models for their child. This would not only be unnecessary but simply ludicrous, for it is obvious that even those hearing persons with many years of close contact or frequent working experience with deaf individuals and certifications for a whole series of sign language courses are very, very rarely fluent enough to pass as *native* language models and stand comparison to regular speaking parents with hearing kids (Donath & Donath, 2002). However, as discussed in the chapter on sign language, this is also not necessary.

Nevertheless, to offer the recommended native language models and at the same time provide deaf role models for positive identification, other suggestions are made, such as including deaf adults into early intervention and school programs (Jamieson, 1994; Hintermair, 1998; Kammerer, 1999; Papaspyrou, 2002; List, 2002). Getting to know self-confident and successful deaf adults is often experienced as a great relief, since it offers parents a positive perspective for

¹⁰³ It has been criticised, that many parents lose their enthusiasm for sign language and sign courses later on (e.g., Diller, 2002). This might well be the case, but for various reasons that are not subject to this discussion and do not necessarily have a negative impact on the parent-child relationship.

¹⁰⁴ All were part in bi-bi programs.

¹⁰⁵ If, in fact, their effort is strong enough to progress this far!

their deaf child's future and presents impetus for critical reflections (Hintermair, 1998; Donath & Donath, 2002).

However, there is also potential for conflicts in this constellation: On the one hand, the parents can somewhat delegate the responsibility to supply sufficient communicative input to facilitate an uninhibited language acquisition, and can thus resort to a relaxed family interaction and the natural process of bonding. And invariably, I might add, this will include a large proportion of spoken language, since this obviously happens to be the mother tongue of most deaf children's parents¹⁰⁶, and will thereby enhance the child's oral skills in a natural way without restraining communicative exchange (Prillwitz, 1986).

On the other hand, parents might fear that the relationship to the deaf and signing professional will deepen to a degree that they as parents are somewhat *replaced* in practical function (engaging in private discussions or mutual activities) and emotional bonding (Young, 1996). However, few cases are reported where this is so, and it can only be speculated whether it would be more beneficial to those families to part with sign language and resume the family and instructional communication in spoken language only.

At any rate, whether in sign, speech, or simultaneous communication, „the deaf child has to be enabled to fully communicate with their parents in a natural language. This communication should set off as early as possible, so that a relationship built on trust and mutual bonding can be developed on both sides“¹⁰⁷ (Grosjean, 1998, p. 1). Children do not learn language merely for the sake of language, but in and for the acquisition of culture in the sense of a primary socialisation (List, 2002, 5; Wersich, 1992). And at least in the first years of a child's life this is taking place on a highly emotional level of interaction.

As mentioned in the introductory statement of this chapter, many authors have elaborated on the importance of early communication for the parent-child relationship, which, in turn, is the crucial foundation for language acquisition (no matter which type!), cognitive and social development (Bruner, 1987; Diller & Horsch, 1997; Horsch, 1997, 2001a). Special focus has been set on the preverbal interaction among mother (in most cases) and infant. Certain paralinguistic features – such as raised vocal pitch, phrasing of sentences, frequent repetition of utterances, distribution of rests, and so forth – in connection with strong eye and body contact and a turn-taking behaviour have been found to be natural in hearing mother-child dyads (Bruner, 1987; Horsch, 1997; Diller & Horsch, 1997). Consequently, certain issues arise:

11.1. Spoken and sign “motherese”

The above-mentioned vocal features are inherently reserved for spoken language, but astonishingly similar visual counterparts have been found in deaf mother-child dyads: Certain attention getting and directing behaviours (such as waving in the child's field of vision, tapping, etc.), presenting signs larger, slower, and more clearly articulated than in an adult conversation, repeating them, pausing and waiting for response, and the like (Gallaway, 1998). In a direct comparison, DD mothers were found to not match the sheer quantity of linguistic input provided by HH mothers. However, hearing children can attend to an object

¹⁰⁶ The percentage of hearing parents to deaf children is estimated (according to source and definition) somewhere between 90 and 95%.

¹⁰⁷ Original quote: „[das gehörlose Kind] muss mit Hilfe einer natürlichen Sprache mit seinen Eltern voll kommunizieren können. Diese Kommunikation sollte so früh wie möglich beginnen, damit sich eine vertrauensvolle und gemeinschaftliche Beziehung zwischen Kind und Eltern von beiden Seiten her aufbaut“ (translation by jh.).

while listening to explanations at the same time. Deaf children, on the contrary, have to attend to object and communication partner one after another. Deaf mothers seem to realize this *conflict of divided attention* (Wood, 1991) and adopt their signing accordingly. But Gallaway (1998) reports that by the time the children are 18 months of age, the DD children have caught up with their HH peers. She assumes that the great abundance of linguistic stimulus hearing children are exposed to reaches an ‘unnecessary’ level of redundancy, so that deaf children are able to reach the same goal post despite a far lower quantity of input as long as the quality of their linguistic input equals that of hearing children.

11.2. Motherese in DH-dyads

There is no general answer to this question. Parents who have not yet realized that their child is deaf can be expected to treat it as if it were hearing – and this implies: address it with spoken motherese. However, as mentioned in the beginning of this chapter, the diagnosis of a disability is usually a great shock to (hearing) parents and deafness in addition often provokes the feeling that speaking to the child were in vain and silly. Therefore, the ‘natural’ and unconscious basis for motherese is lost and “the main aim of an intervention must be that language exchanges between infant and their carers should be structured so that (a) interaction works and (b) the child receives the maximum quantity of useful linguistic input” (Gallaway, 1998, 50). It has been argued that motherese is by no means a *conditio sine qua non* for language acquisition (Cholewa, 2002, in reference to findings among different tribes of natives in Africa and Asia), but it undisputedly is beneficial to the process and a natural feature in many adults (e.g., Horsch, 2001b). Professional intervention and parent counselling should then be directed towards re-establishing this natural condition and behaviour and the emotional bonding between mother and child.

A comforting statement is made by Wersich (1992), who argues that the communication among parents and infants does in fact show some linguistic elements but does mainly rely on non- and paralinguistic cues comprehensible within a specific situational context that is equally accessible to hearing and deaf infants (Wersich, 1992, 13).

Krüger (1987) also claims that „the mean part of preverbal communication processes develops mostly without interferences (...), if formalised manual systems are made an early and intentional use of – wherever possible – they even progress astonishingly well”¹⁰⁸ (p. 60). And Grosjean (1998) corresponds: „In contrast to spoken language [sign language] allows an early and ideal communication among parents and child (provided that they acquire sign language as early as possible)”¹⁰⁹ (p. 1).

12.3. Implications for Bilingual Deaf Education

Motherese is helpful but not an unwavering precondition for language acquisition. Hearing parents might find it difficult to employ vocal motherese with their deaf infant but can not be expected to produce it in sign language (unless

¹⁰⁸ Original quote: „ein Großteil vorsprachlicher Kommunikations-prozesse entwickelt sich relativ ungestört (...), bei frühzeitiger gezielter Zuhilfenahme formalisierter Manual- und Gebärdensysteme – wo das möglich ist – sogar überraschend positiv“ (translation by jh.).

¹⁰⁹ Original quote: „Im Gegensatz zur Lautsprache erlaubt [die Gebärdensprache] eine frühzeitige, optimale Kommunikation zwischen Eltern und Kind (unter der Bedingung, dass diese sich die Sprache so früh wie möglich aneignen)“ (translation by jh.).

they happen to be native or fluent signers themselves, like e.g. most CODA). What should be taken as a general rule is that if parents can manage to feel comfortable with it, they should engage into vocal motherese – or at least spoken input in any way they like – as much as daily routine allow. If, in addition, they start to provide visual communicative cues as well, I can not – based on the literature reviewed by me and the personal conversations lead with various professionals and parents – find any fault in this but only a chance for a possible future communicative advantage for that child. Even the greatest auditory-verbal and aural-oral authorities will yet have to produce convincing evidence that such bilingual stimulation is detrimental to any aspect of child development whatsoever¹¹⁰.

In contrast, a poorly functioning communication among parents and child tends to lead to more directional and restricting behaviour in parents. Oral-aural HD-parents have been found by Jamieson (1994) to be more directional than HH and DD, „...occasionally supplementing verbal instructions with pointing. Thus, the deaf child was not given much opportunity to take initiatives during the early part of the interaction” (p. 443).

This view is supported by Spencer & Gutfreund, as well as Krüger (1987), who, after having produced an entire list of negative phenomena observed in DH, argues that „deaf children of deaf parents and deaf children whose parents use signs and other manual cues show ‘more normal’ behaviour in many ways and greater psychosocial, cognitive and linguistic progress”¹¹¹ (p. 54).

And the interaction sequences observed by Prillwitz & Wudtke (1988) in the families of their bilingual early intervention program featured significantly more communicative ‘units’ compared to pre-intervention findings, which the authors explained with the decisively larger fund of linguistic means leading to richer communication and better comprehension in the children (p. 54). They argue that effective and unrestricted communication is a prerequisite for a deep and lasting relationship. Already a few years earlier, Prillwitz wrote that the syntactically and semantically increasingly complex communicative sequences found in the bilingual families appeared to aid the child’s comprehension and reflection of social actions. Parents in turn tended to give more explanations and elaborate more on family plans, view points and reasons for certain happenings. This enhanced their mutual understanding and communicative exchange in general and was lead back directly to the functioning linguistic (bilingual) system within these families (Prillwitz, 1986).

On the other hand, communication is not automatically guaranteed when parents find sign language to be of great potential to their deaf child and start to attend sign language courses: First, it appears that quite a number of parents start out enthusiastically but do not manage to cut out the spare time continuously to attend courses and/or meet with deaf adults to keep up with their child’s progress (Vaccari & Marschark, 1997). Also, many parents use signs only when directly addressing the child and not when interacting with their partner, other adults, children or therapists (compare Magnuson, 2000).

And finally, a fact that also works against a positive effect of sign language in deaf education, is the great problems hearing adults seem to have in adopting

¹¹⁰ Evidence for unfavourably development (usually in aural-oral skills) that has in fact been produced, has not been able to show that it was the particular effect of manual communication that lead to these deficits (List, 2002).

¹¹¹ Original quote: “Gehörlose Kinder gehörloser Eltern und gehörlose Kinder, deren Eltern auch Gebärden und andere manuelle Mittel benutzen, zeigen in vieler Hinsicht ‚normalere’ Verhaltensweisen und Entwicklungsfortschritte psychosozialer, kognitiver und sprachlicher Art“ (translation by jh.).

matching interaction behaviours, such as specific attention getting behaviours (Gallaway; 1998) and to offer enough time for the child to shift focus of sight between interaction partner and object of joint attention to avoid the *conflict of divided attention* (Wood, 1991; Gallaway, 1998; and others). All of these are problems that need to be mastered, but they represent not as such a conflict of signs and speech.

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We can come to a conclusion at this point: An effective communication is not primarily relying on a particular modality but on an unimpeded exchange of thought in general. This in turn can be achieved with speech (if residual hearings allows), sign, or simultaneous communication, in infants even to a large extent with merely para- and non-linguistic cues. There is no compelling evidence that a bilingual language exposure has negative effects on communication, interaction or emotional relationship within families. The studies reviewed even suggest an advantage of TC and bilingual mother-child dyads over oral ones.

However, a ‘good relationship’ grows multifactorial. Conclusions from incidents of positive sign language-relationship-correlations to general statements have to be made with caution! It is well possible, for example, that parents who adopt sign language have a more positive attitude towards deafness and their child’s potential in general. Then it might be this underlying positive energy that leads to a better parent-child relationship rather than the effect of a sign communication. Also, a native signer will use sign language in a quality that hearing parents are very unlikely to achieve. A purely aural approach on the other hand is often incapable of transporting sufficient language, meaning and ‘natural’ interaction to a deaf child.

What is clear without doubt, is that a shared language system and effective means of communication allows for better interchange of thought and more effortless and casual expression of emotions, which I clearly see as the foundation for a positive relationship. However, as already stated, this factor is completely independent of modality issues. A family could adopt both sign and speech simultaneously if its members chose to do so on the grounds of their personal needs, wishes and resources. This is why Hintermair (1998) suggests to parents that it is not a loss but a gain to not make a definite decision for any approach right away, but to take sufficient time to look into aural as well as bilingual programmes, so that “by means of an inner dispute a well-founded basis for a then truly own decision can slowly emerge”¹¹² (Hintermair, 1998, 82).

¹¹² Original quote: „durch innere Auseinandersetzung [sich] langsam eine reelle Basis für eine dann wirkliche eigene Entscheidung anbahnt“ (translation by jh.).

12. Deaf Children of Deaf Parents

It seems to be a prominent phenomenon that “the deaf children who are the most competent in their social, cognitive and linguistic development are those who have participated in active linguistic interaction with their parents from an early age” (Magnuson, 2000, 7). A whole number of authors report such findings (Krüger, 1987; Prillwitz & Wudtke, 1988; and others). What is noteworthy is that “this applies both to deaf parents and to hearing parents who have learned sign language, which permits them to interact meaningfully with their children. The child not only learns facts through this interaction, but also gains behavioural and cognitive strategies, an understanding of self and others, and a feeling of being part of society” (Magnuson, 2000, 7; see also Prillwitz & Wudtke, 1988).

Here are some findings, sorted according to the areas, DD are reported to be superior in:

12.1. Language Development

As already described in Chapter 9, deaf children growing up in a signing environment experience a language development comparable to that of hearing-speaking children in every linguistic perspective (Prillwitz & Wudtke, 1988; Boyes Braem, 1995; Petitto, 2000; Petitto et al., 2001a; Marschark, 2001). Their partaking in interactions demonstrates that DD are more sensitive to the linguistic and communicative needs of their interlocutor than are those of DH (Kammerer, 1999, 101). This is also reflected in their ability to code-switch effortlessly according to the necessities of a specific communication setting (Petitto, 2001c, 454; Wagner, 2001, 509; Mayer & Akamatsu, 1999, 3).

Although they receive no support from their parents in terms of control and feed back on articulation, “their speech is in no case worse than that of deaf children the same age with hearing families”¹¹³ (Prillwitz & Wudtke, 1988, 118). Prillwitz and Wudtke (1988) even argue that they have a significant lead in lip-reading and literacy, which the authors explain with the children’s strong sign language competence and the inclusion of speech-related lip movements in many signs (p. 85) as well as a solid L1 foundation to build up spoken language on: “Contrary to a deaf child growing up without sign language, they have communicatively as well as formally mastered a mature language with an elaborate lexicon and a well defined grammar even before they enter school. On this basis they are much more apt to manage the oral learning process, even with far less input than hearing families can provide for their deaf child”¹¹⁴ (Prillwitz & Wudtke, 1988, S. 118).

¹¹³ Original quote: „(...) sind sie in ihrer Sprechfähigkeit durchweg nicht schlechter als gleichaltrige gehörlose Kinder aus hörenden Familien“ (translation by jh.).

¹¹⁴ Original quote: „Im Gegensatz zum gehörlosen Kind, das ohne Gebärdensprache aufwächst, verfügen sie kommunikativ wie formal schon vor dem Schuleintritt über eine vollwertige Sprache mit einem elaborierten Lexikon und einer differenzierten Grammatik. Auf dieser Grundlage ist es

However, not every sign language is as oral-oriented as German Sign Language (DGS), and making orthographical choices according to perceived lip movements is one of the main sources for spelling mistakes in deaf individuals written compositions (Krausmann, 1998/99; Hildmann, J. 2002). And even the positive effects cannot be unilaterally attributed to sign language, since “it is important to note (...) that the overall language advantages seen in deaf children of deaf parents seem largely attributable to the language learning *environment* rather than anything inherent in sign language per se” (Marshark, 2001, ii).

12.2. Academics

Although the level of achieved education is generally lower in deaf compared to hearing adults, many researchers and teachers report significantly better academic achievements in deaf DD-children compared to DHs (Strong & Prinz, 1997; Fertig, 2001; Bernatzky, 2001; Kremp, 2002). “Parental hearing status was found to be a good predictor of future linguistic and academic success, with DP children typically outperforming HP children, at least in the early years (Strong & Prinz, 1997, 38). They explain this with this group’s early advance in sign language: “DP children are more likely to grow up learning American Sign Language (ASL) than HP children, and this first language exposure is critical in preparing deaf children for future school learning, particularly in English literacy” (Strong & Prinz, 1997, 38). And with regard to what we have said about phonological awareness and reading, they add: “Braden (1994) attributes the DP advantage specifically to the fact that DP have an internal language base, which facilitates their acquisition, storage, and application of academic knowledge” (ibid.). Gregory (1998) even reports on an average nonverbal IQ of 108 in DD-children, which is significantly above that of hearing peers (p.25) – but noteworthy, only the nonverbal IQ!

12.3. Social Development

As the first advantage for DD, Meadow (1980) claims that „deaf parents are less likely to define the diagnosis of deafness in their child as a tragic crisis” (p. 12; also Prillwitz & Wudtke, 1988). This of course would function as basis for a positive relationship and emotional stability. But Hintermair and Horsch (1998) did not find overall significant differences in a study on the *Parenting-Stress-Index*¹¹⁵ they conducted among hearing-impaired compared to hearing parents. They even found that the former – in their population – had greater difficulties than the latter to establish a positive emotional relationship with their children. This is quite contradictory to most reports on this topic (e.g., Prillwitz, 1984), and Hintermair and Horsch argue that this finding might be due to all parents in their study being hard-of-hearing instead of Deaf, and that therefore other factors such as embarrassment about their own disability might influence the parent-child bonding.

According to Jamieson (1994), DD parents have the same high expectations for their deaf children’s involvement and success in an observed task as did HH (p. 446). Erting (1987) explains such similarity with the hypothesis that deaf

ihnen viel besser möglich, die oralen Lernprozesse zu vollziehen, selbst bei weitaus geringerem Input als es hörende Familien ihren gehörlosen Kindern geben“ (translation by jh.).

¹¹⁵ according to Abidin, 1990

parents have similar experiences and biographies as their children and know that deafness is not a reason for academic or personal failure. Therefore, they raise the same expectations and offer just as many explanations and give space for autonomy in daily routines as HH-parents. The only difference seems to be the mode of communicative interchange (compare Jamieson, 1994, 446).

*

With regard to the deaf children (or in many cases: adults) with deaf parents, who I know among my own acquaintances, I can only confirm the view that they have academic, linguistic and to a lesser degree social advantages over deaf individuals from hearing families. Definitely, they have by far closer relationships and more frequent and in depth communication with their parents. Partially, this is – no doubt – due to their shared language, but some parts (and this is why I did not wish to simply include findings on DD into the other chapters) are most likely caused by underlying factors such as positive attitude towards deafness, emotional support, shared experiences and the like. Nevertheless, almost all remarks on DD-children present them in a favourable light, which should make us educationalists thoughtful and eager to investigate which in particular those beneficial factors might be to promote them in HD-children as well – as far as possible.

13. Conclusion

With this paper I have made the attempt to provide a comprehensive view on some of the most important dimensions of child development under conditions of deafness and bilingual exposure. The intention was to compare and contrast some of the arguments and findings, and possibly shed some light on the facts behind the discrepancies among specialists favouring and condemning the implementation of early intervention and school programmes implementing signs. – Nota bene that I am not even going as far as to say *sign language*!.

But what has hopefully become evident for every reader, is that whether an intervention programme is considered successful or not – which in itself is a matter of subjective opinion! – does not primarily depend on the modality of the language used to interact within the setting, but on a plethora of interrelating social and other factors, such as an adequately stimulating educational environment, emotional stability and support, parents' resilience to cope with their child's disability, positive social networks, and many others. But all these, crucial as they are, have not or hardly been addressed in this paper, so that it is neither intended nor possible to come to any once-and-for-all verdict on the vice or virtue of a bilingual approach to the development of *the* deaf child. After all, the population of deaf children is as heterogeneous as their hearing peers, and to deal with individuals always means that we – being the specialists in deaf education – have to be able to offer individual choices in and for an increasingly pluralistic society and according to individual priorities, personal resources and needs (Hintermair, 1998; Hintermair & Horsch, 1998; Marschark, 2001).

This is why Lynas (1994) speaks of a 'dilemma' when having to choose between communication options in the education of a deaf child, and Marschark (2001) states likewise: "Current research cannot provide complete guidance for policy and practice in regard to educating children who are deaf, and certainly cannot provide specific guidance for a particular child, as individual circumstances greatly influence outcomes" (Marschark, 2001, 1). And much further research is needed, because most studies cover only very selective issues in mostly statistically irrelevant sizes of experimental groups so that generalisations can rarely be made. In addition, much is based on unsystematic observations and anecdotal or casuistic material.

Does this mean there are as many questions as before?! – I believe not, because although one has to be cautious not to attribute too much positive or negative effect to one single factor (such as bilingual exposure), some indications have occurred frequently enough to provide a basic pattern, which can be summarized as follows: Against frequent claims, there is no true evidence for any interference among spoken and sign language on any level. Empirical, informal observations that might lead to such an impression are attempting mono-causal explanations for multi-causal issues. Even a 'hard science' like neurology has not advanced far enough in research to explain all the questions and contradicting hypotheses that are circulating.

And some of the general contradictions are not truly such when examined more closely. For example, all supporters of sign language in deaf education will have recognized by now the invaluable asset of technological aids available nowadays and the necessity of spoken language skills for an as unrestrained as possible interaction in this hearing world. However, is it not possible to promote

the one without neglecting the other? And at least in my eyes it appears obvious that both sign and speech have their irrevocable strengths: Sign language in providing easy, fast and effortless access to a full language system (with all its secondary effects and chances), and speech, speech-based sign and aural skills fostering phonological coding essential for high levels of literacy and allowing easy code-switching to spoken language and proper enunciation where it is desired and helpful. And both together should promote the growth of confident and content personalities in our deaf students.

If then everything is as I have written – with which the experts may or may not agree –, then should we not consider a bilingual approach as one legitimate and valuable option among many that need to be evaluated and discussed in view of each particular family, regarding their aspirations, resources, and needs? And is it then not prime time to re-evaluate the infrastructure of professional services to deaf individuals and their families, and to critically scrutinize our own minds on what we believe and what is possible? I believe, there should be sign competent (and ideally some d/Deaf) specialists in each institution offering educational services for deaf persons, as well as professionals specializing in the promotion of aural and oral skills, to aid in improving speech and lip-reading ability, aural sensitivity and speech comprehension, and literacy skills and communicative versatility. One may philosophize all one likes on the long-term future of deafness and deaf education en large, but there are profoundly deaf children in our tutelage *today*, and we have chosen to take professional responsibility for them that we may not deny. And this responsibility we will claim best if we consent that

„sign language and spoken language should not be considered as mutually exclusive alternatives, but as potentially complementary strategies” (Marschark, 2001, iif.).

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¹¹⁶ HörPäd = Hörgeschädigtenpädagogik

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Abbreviations

ASL	American Sign Language
bi-bi	Bilingual bicultural
CI	Cochlear Implant
CODA	(hearing) Children Of Deaf Adults
DD	Deaf children with at least one deaf parent
DGS	Deutsche Gebärden Sprache, i.e. German Sign Language
DH	Deaf children of hearing parents
DP	Deaf parents
GAEL-S	Grammatical Analysis of Elicited Language – Simple Sentence Level
TC	Total Communication
HH	Hearing children of hearing parents
HP	Hearing parents
LBG	Lautsprachbegleitende Gebärden , comparable to Signed Exact English (SEE) or Signed English (SE)
LSQ	Langue des Signes Québécoise
L1	First language
L2	Second language
OA	Oral-aural
SE	Signed English or English-based sign
TOEFL	Test Of English as a Foreign Language